

# AVIATION WEEK

A MCGRAW-HILL PUBLICATION

JUNE 9, 1952

50 CENTS

## *Gas Turbine Thermocouples by* **BG**

Engineered, developed and produced to meet the exacting requirements of gas turbine engines, BG thermocouples provide maximum performance and durability.

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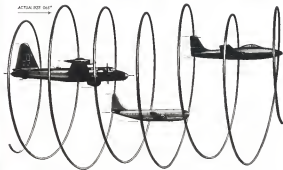
The Engine: Pratt & Whitney Aircraft J-48 Jet  
Fuel Metering: Holley Turbine Control

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The secret of the new Kidde Fire Detector is in the ceramic insulation of the two small Inconel conductor wires. Encased in a thin-wall Inconel tube, they form the continuous fire-sensing element that encircles the power plant.

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THE DOW CORNING SILICONE RUBBER

## \* stays elastic ...in oven heat or arctic cold

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It is the only resilient insulating material that is not damaged by long exposure to the heat generated in overloaded traction motors. It gives long and reliable service as an insulating material for Navy control cable and for ignition cable in aircraft and ordnance vehicles. Silastic also repels water, and shows remarkable resistance to oxidation and to outdoor weathering.

Silastic has properties that may easily suggest some sales-making ideas of your own. Write for a free literature or call today for new data on the properties, performance and applications for all Silastic stocks.



Sticks sticks and gaskets are used to seal steam chambers to eliminate steam loss because Silastic is heat-resistant to water, gasoline, kerosene and resistant to expanding temperatures ranging up to 500°F. Its leaching and fluid expansion indicates that Silastic seals will retain their elasticity for the entire service life of the line.



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Silastic pads and rollers are frequently used to apply pressure to heat-curing equipment. In this application, to ensure a Silastic strip is used in heat-curing equipment with a silicon oil seal. It is resistant and non-detractive over long periods of service at surface temperatures above 500°F.

Plastic coating of cable manufacturing Co.

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☐ Silastic Facts No. 12 on properties and performance.  
☐ List of Silastic Products.

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Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ State \_\_\_\_\_

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## NEWS DIGEST

### Domestic

An Coordinating Committee has approved CAA-requested priorities for production of 40 more transports or ferries in the last quarter. CAA-25 Douglas DC-7s and 18 Convair 440s, PAA-1 DC-6As, Peraga-2 DC-6Bs (Peraga now has four DC-6Bs on order). The biplane total number order to 124 places for delivery in the next 30 months.

Airlines ordered out schedules June 2 following a month of cancellation resulting from oil strikes. All the flights arrived in an excellent time, but PAA, for example, estimates that cancellations during last two weeks in May cost it about \$500,000.

President to forward rank of Lt. Gen. Louis Norrell, commanding USAF in Europe, and Ohio P. Weiland, commanding 1st Air Force, Tokyo, have been recommended by President Truman.

Miss Gurnea, most recently administrative assistant in Bureau Office of Public Information, retired May 31 after 34 years' association with Naval Aviation. In 1946 she married the Navy Captain Merwin A. Gurnea.

J. E. Warren is new deputy chief of Petroleum Administration for Defense, succeeding Bruce K. Bevan. Warren has 30 years of experience in oil production.

High school course during studies toward technical aviation career is being presented in CAA Administrator Charles H. Hume's course, used by elementary and secondary students.

Harry M. Chase, president of Harn M. Chase, Inc., operator of Pacific Aircraft Services, Dallas, died May 21 in Dallas, Tex. Chase was active in aviation for 25 years.

Utility Aircraft Canada is new title of Aeroflight Canada's Personal Aircraft Center. AIA built new sales lot to describe today's new transport plane trend, will also have more impact in dealing with government agencies.

Official federal certification has been given TWA's ten Lockheed Super Constellation. They differ from previously certified Super Constables ordered by Eastern Air Lines in carrying 98 more passengers, C18C2, Wright engines, 327 mph, cruising speed, additional 730



Vought Stuntplane with wingspan of but 7 ft. 2 in and length of 9 ft. 10 in is maintained by design holder Ray Sten (left) and Bob Sten prior to first flight May 25 at Palo Alto airport. Gift financed by an 85 hp Continental, topped up to 132 hp by the plane but 147 mph on flight. It took a year to build, cost was \$2,500.

gal fuel tank in wing center section, long range navigation equipment and Hughes turbine warning indicator.

Andrew Jackson, former Associated Press bureau chief in Rome and later Special Assistant to Public Relations to the Director of Mutual Security Agency in Washington, is slated to become Director of Public Relations, Department of Defense, replacing Clayton Frutkin, who resigned that post but will work to become Special Assistant to President Truman. Frutkin and his management would not overlap activities of Press Secretary Joseph Stuart. Lt. Col. P. Chester Newton, USAF, until recently military attaché in France, has been given a European assignment.

### Financial

Jack & Horne, Inc., Oakland, had \$1 million in billings during April. Billings in 1955 \$7 million.

Genet Corp., Los Angeles, has disclosed a 40 cent quarterly dividend payable June 25 to holders of record on June 10.

Living Tugs Line reports gross revenues of \$16,251,559 for the nine months ended ending May 31, a 45% gain over last year. Net profit after taxes was \$1,174,195.

### International

John Paul Bennett, director of the U. S. State Dept's Office of Transport

and Communications Policy, has been charged with the task of the assembly of the International Civil Aviation Organization. Vice presidents elected were Col. B. M. Azzam of Beirut, A. Khaled Hassan of Ireland, Dr. R. S. Gupta of India and E. Berg, Switzerland.

Two delivery trainees reportedly are being sent to A. V. Roe & Co., Ltd. They apparently are based on the Gloster G.A. 5 two-seat biplane weather fighter. Avro has delivered 11,020th and final Avro production of which began in 1955.

Ansett Airways, Australia, was scheduled to start flying last winter May 31 using two Short Sunderland and several Convair Catalinas.

Transport aircraft service will begin in the spring, 1955 if governments concerned reach agreement concluded at a Buenos Aires meeting of the Inter-national Air Transport Association. Service will operate between ports in Belgium, The Netherlands, France, Switzerland, Germany, Italy, Austria and the United Kingdom. Airline rates will be 20-25% cheaper than first-class rates, night rates will be 33-35% cheaper.

Canadian Dept. of Defense Production has placed orders for \$1,079,000 with Canadian firms for aircraft parts, spares, and mechanical work during period May 16-April 15. British Aerospace, Hughes Aircraft Ltd., Montreal, Emerson Electric Co., and other firms are among suppliers and contractors.

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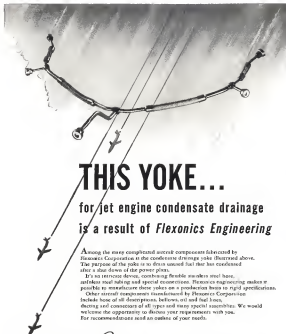
2284 Calaveras St. • Santa Mexico, Calif.

## AVIATION CALENDAR

- June 9-15—National Fire Protection Assn. annual meeting, aviation session on June 15, Hotel Statler, New York.
- June 15-18—American Society of Mechanical Engineers, annual meeting, Sheraton-Columbian Hotel, Cincinnati.
- June 16-17—Aviation Distribution and Maintenance Assn., and visa meeting, The Grand Hotel, Macineux St., Michigan.
- June 17-18—Aviation Trade Show, national exhibit of aircraft parts and equipment, Hotel Park Statler, New York.
- June 19-21—American Society of Mechanical Engineers symposium on shock and vibration instrumentation, Pennsylvania State College, Pa.
- June 20-27—American Society for Testing Materials 52th anniversary meeting, Statler and New Yorker Hotels, New York.
- June 24-26—Aircraft and engine analysis conference, sponsored by Scientific Magazine division, British Aviation Club, London, N. Y.
- July 11—American Meteorological Society national meeting, including joint session with the Institute of the Aeronautical Sciences, Hotel Statler, Buffalo, N. Y.
- July 23—Northwestern States Seating Meet, Kansas, N. Y.
- July 4-9—Naval, Navy all matters transactional as well as Santa Ana, Calif.; in Yulchboro, N. J.
- July 5-12—Aviation Workers Assn. annual convention, Ambassador Hotel, Los Angeles.
- July 14—Napoli as taken form given used by Corporation Aircraft Division (St. Louis div.) and CAA, topic to be "Weather Flying," Knott Airport, St. Louis.
- July 16-18—Institute of the Aeronautical Sciences annual meeting, building, Los Angeles.
- July 18-20—Western Trade of America in hotel convention, Chattanooga, Tenn.
- July 21-26—Silver jubilee celebration, Fokker Golden of Aeronautical Technical, Paris, France, East St. Louis, Ill.
- July 26-31—University Aviation Assn. 6th annual meeting, Ball State Teachers College, Muncie, Ind.
- Sept. 1-7—Society of British Aircraft Constructors, annual display, Farnborough, England.
- Sept. 15-16—International Air Transport Assn., eighth annual general meeting, Geneva, Switzerland.

## PICTURE CREDITS

1.—Los Angeles Times; 2.—UPI; 3.—UPI; 4.—UPI; 5.—UPI; 6.—UPI; 7.—UPI; 8.—UPI; 9.—UPI; 10.—UPI; 11.—UPI; 12.—UPI; 13.—UPI; 14.—UPI; 15.—UPI; 16.—UPI; 17.—UPI; 18.—UPI; 19.—UPI; 20.—UPI; 21.—UPI; 22.—UPI; 23.—UPI; 24.—UPI; 25.—UPI; 26.—UPI; 27.—UPI; 28.—UPI; 29.—UPI; 30.—UPI; 31.—UPI; 32.—UPI; 33.—UPI; 34.—UPI; 35.—UPI; 36.—UPI; 37.—UPI; 38.—UPI; 39.—UPI; 40.—UPI; 41.—UPI; 42.—UPI; 43.—UPI; 44.—UPI; 45.—UPI; 46.—UPI; 47.—UPI; 48.—UPI; 49.—UPI; 50.—UPI; 51.—UPI; 52.—UPI; 53.—UPI; 54.—UPI; 55.—UPI; 56.—UPI; 57.—UPI; 58.—UPI; 59.—UPI; 60.—UPI; 61.—UPI; 62.—UPI; 63.—UPI; 64.—UPI; 65.—UPI; 66.—UPI; 67.—UPI; 68.—UPI; 69.—UPI; 70.—UPI; 71.—UPI; 72.—UPI; 73.—UPI; 74.—UPI; 75.—UPI; 76.—UPI; 77.—UPI; 78.—UPI; 79.—UPI; 80.—UPI; 81.—UPI; 82.—UPI; 83.—UPI; 84.—UPI; 85.—UPI; 86.—UPI; 87.—UPI; 88.—UPI; 89.—UPI; 90.—UPI; 91.—UPI; 92.—UPI; 93.—UPI; 94.—UPI; 95.—UPI; 96.—UPI; 97.—UPI; 98.—UPI; 99.—UPI; 100.—UPI; 101.—UPI; 102.—UPI; 103.—UPI; 104.—UPI; 105.—UPI; 106.—UPI; 107.—UPI; 108.—UPI; 109.—UPI; 110.—UPI; 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## THIS YOKE...

for jet engine condensate drainage  
is a result of Flexonics Engineering

Among the most complicated aircraft components fabricated by Flexonics Corporation is the condensate drainage yoke (illustrated above). The purpose of the yoke is to drain unused fuel that has condensed after a shut-down of the power plants.

It's a intricate device, combining flexible stainless steel hose, air-tight metal tubing and special connectors. Flexonics engineering makes it possible to manufacture these yokes on a production basis to rigid specifications. Other aircraft components manufactured by Flexonics Corporation include hose of all descriptions, bellows, oil and fuel lines, ducting and connectors of all types and many special assemblies. We would welcome the opportunity to discuss your requirements with you. For recommendations read an outline of your needs.

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FORMERLY CHICAGO METAL HOSE CORPORATION

Flexonics identifies solutions of flexible hose engineering that have served industry for over 50 years.

Manufacturers of Condensate and Propellant Flexible Metal Hose in a Variety of Metals • Intersected Arms in Pump Systems • Bellows, Duct and Hose Bellows • Flexible Mount Controls • Assemblies of these components  
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## WHO'S WHERE

### In the Front Office

Donald A. Duff has joined Wisconsin Central Airlines as executive vice president general manager. Duff, who has held a number of executive airline positions, previously was with Colonial Airlines.

Donald O. Severson has resigned as vice president manager of operations for L. Eisebren & Co., Norwalk, N. J., to accept a vice presidency with E. M. Hollingshead Corp., Camden, N. J., where he will direct sales and merchandising.

Carl C. Nelson has been named vice president in charge of manufacturing, purchasing and engineering for Velsiton Corp., Los Angeles, and director of operations for its retail participants and equipment. He previously was a design engineer for Velsiton, Inc. H. C. Shook has been appointed assistant in the president of the Velsiton corporation.

### Changes

Louis F. Brown has been named manager of Air America's Aviation Supplies division's Miami branch.

Dr. J. H. Henshaw has assumed the Engineering Mechanics division of Aeronautics Research Foundation of Illinois Institute of Technology in recent months.

G. F. Henson McCord has been promoted to general contracts manager for Seneca Aircraft Services, Inc., Troyville, N. Y. Robert Long has been named contracts administrator for Western Sky Industries, Oakland.

Samuel (Zuke) Doss has been named director of technical development for Continental Airlines. Richard T. Downham has been promoted to director of sales for the carrier, replacing W. Robert England, retired.

Gilbert C. Flaxler has been designated aircraft representative in New York for Swissair.

### What They're Doing

Christopher Dikes, formerly chief engineering development at BAC, has established himself as a consulting aviation engineer specializing in air transport problems such as those involving selection of new equipment.

William S. Holloway is resigning from 11 as manager of Executive International Air port.

### Honors and Elections

John A. Cunningham, Mid-Continent Airlines vice president operations, has been elected president of the carriers under aegis of the Air Transport Association.

Edward M. Hoffman has been elected a director of Colonial Airlines. He is a member of the law firm Hoffman, Thomson, Hennessey and Sherman.

Arthur E. A. Mueller, Wisconsin Industries, has been named chairman of the board of Wisconsin Central Airlines.

## INDUSTRY OBSERVER

USAF is testing a new machine gun which can fire up to 5,000 rounds per minute. Weapon is for use on bombers to give a much needed increase in firepower. The gun was developed by private industry under Army Ordnance contract and tests to date indicate it is extremely rugged and reliable.

Boeing Aircraft Corp. plans to get into production of its Model 50 Twin Bonanza airplane sometime about the first of next year, with initial rate of three planes a month being stepped up to about 25 a month by the end of 1955. Boeing planned production has been delayed due to tooling and other production difficulties.

Fact that two of USAF's hottest test pilots flew the Chance Vought Navy F7U-1 this spring at Dallas has given additional evidence to reports that AF is interested in buying some of the later F7U-3 Corsair planes for ground support missions. Air Force pilots who swung out the F7U-3 were Col. E. L. Anderson and Lt. Col. R. H. Johnson, both world speed record holders in North American P-86 Sabres.

North American's P-86D interceptors are using the new General Electric electronic engine controls. These automatically regulate the mixture, pressure and temperature of the J47-17 engine and adjustments for maximum thrust and acceleration at any altitude and speed, relieving the pilot of monitoring many engine instruments.

Despite Air Force insistence that it fully favors jet transport development, the Air Force has pulled the two twin CF-47 jet pods from under the C-124A. Reason claimed by USAF was that the \$100,000 plane had developed a fuel leak. Company officials are still unable to find the leak.

Pratt & Whitney commercial jet prospects for the R4300 Warp Major are looking up with new consideration being given for its use in Douglas DC-7 by United Air Lines and other DC-7 prospects buyers. It is being marketed against the Wright Turbo-Cruise R3550, with a sales argument that the Warp Major is now delivering 5,500 hp for takeoff and 3,800 hp for cruising, which is what the outmoded Wright engine is designed to do. Both engines carry a capacity reduction of the turbine from that used for the present DC-6 powerplants. Pratt & Whitney R3500s.

While versions of the Pratt & Whitney turbo-prop T34 engine being produced for installation in Navy's helicopter Super Constellation and USAF's helicopters are rated at 8,500 ehp, Navy spokesmen have forecast that eventually the engine will go up as high as 9,000 ehp. Initial engine rate of 8,700 ehp and some variants now are rated at 8,000 ehp.

Elmer Helicopter has lightened its target helicopter by installing dual landing gear in place of the original Florent gear, and now operates it as a two-place for short duration flights with the increased payload.

Recent reports brought back from Korea indicate North American F-86 Sabre fighters equipped with a new radar guidance were landing down eight times as many MiGs as other F-86s in their operations which were not yet so equipped. The radar automatically provides target range information to the guidance computer (Aviation Week Feb. 25, p. 45).

Production prospects for Boeing's low-engine B-47C jet bomber are not bright. The last phase of the four jet B-47 version has been ready for its engines at Wichita for quite some time, but still hasn't received them. And recently the Air Force quickly issued a "stop-work" order on further expenditures on the low-jet plane. It still is so the long term USAF program, but whether it will remain there depends on whether Air Force gets additional funds beyond the post-downed 1953 budget proposed in the House. Chances are good that USAF will forgo the gains of range, etc., proffered for the B-47C and stick with the six jet B-47s exclusively.



## Fewer Accidents . . . More Serious Results

Plagued by queries as to whether aircraft accident rates are declining and as to whether latest plans to use air transport with their arrays of electronic controls and weapon drivers, Air Force is faced with questions it can answer only in generalities because of uncertainty. But the Air Force's safety director has some interesting statistics.

Maj. Gen. Victor Rasmussen, USAF Director of Flight Safety, and an aviator, "When we release actual (specific) statistical information relative to our research systems, we are handing the nation the wrong tools which, with other information he has available, enable him to ascertain our statistics, reductions, state of training, status of maintenance and support effort, status of facilities in our capacity to achieve operations. These facts, which, without the nation's access to our support, when placed with others, reveal highly classified information."

► **Cashes in General**—As a result, he pointed out, he was unable to discuss specifically the accident rate of the B-56 bomber. Describing Air Force accident rates generally, however, he said:

"During the period 1947 through 1951, the Air Force has consistently experienced a decline in the rate of occurrence of major aircraft accidents (number of accidents per 100,000 flight hrs). During this same period, the occurrence of fatalities per 100,000 flight hrs has declined—but not in proportion to the decline in the rate of major accidents."

"Although the frequency of fatal accidents per hour of flight has decreased, the scale of an single major accident is apt to be more serious today than it ever was before. This is because of the fact that, with high performance aircraft, impact speeds are greater. Also, the rate of larger accidents is becoming more extensive and greater

number of passengers and crew members are exposed to injury when an accident occurs."

"During the period 1947 through 1951, the rate of occurrence of major aircraft accidents has declined 25%. During this same period, the number of major accidents experienced by the Air Force has increased 48%. However, the number of hours flown has increased 95%, which indicates that the accident hazard per hour of flight has decreased substantially."

► **Rate Decline**—"The fatality rate," Rasmussen continued, "declined 17% during the period 1947 through 1951. This decline has not been consistent during the period since 1949, although it decreased slightly from 1951 to 1957. The number of fatalities from 1947 to 1951 has increased by 74%. At the same time, the proportion of fatalities which occur in relation to the number of major accidents has increased. In 1947, there were 36 fatalities for every 100 major accidents. In 1951, there were 46 fatalities for every 100 major accidents."

"The rate of occurrence of fatal accidents (accidents in which there are one or more fatalities) has remained more fairly constant during this period. The rates for both 1947 and 1951 were an fatal accidents for every 100,000 flight hours. However, the proportion of major accidents which result in death in comparison to the total number of fatalities has increased. In 1947, 11 of every 100 major accidents involved a fatality or fatalities. In 1951, 37 of every 100 major accidents involved a fatality or fatalities."

"In short," he declared, "it is apparent that the vulnerability to aircraft accidents is lower today than it has ever been. However, if an accident is attended by a major accident, the probability of its being fatal is greater today than in years past."

► **Yielded control**—quicker warning flag modifications to warn pilot quickly and more positively when reverse signaling of the canopy is not left locked.

Airbase activation of the manual shut-off control must show Stand-At-Test and CAA approval of its design and finally, availability of the item.

## Pakistan Cadets Train in U.S.

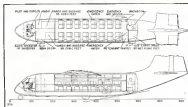
A new class of 30 Royal Pakistan Air Force cadets is getting lighter plane instruction at Hawthorne Flying Service's Camp Field, Jacksonville, Fla.

The RPAF students will receive about 160 hours of flight training in North American T-6 trainers and an additional 60 hours on North American F-51 and Republic F-47F piston-engine fighters. They will also have more than 200 hours ground school work and approximately 15 hours on the L-4 or other simulator.

Hawthorne's Jacksonville base graduated 19 of the first class of 21 RPAF cadets in 1949.



CL-21 DESIGN would cut Canadian to the local service aircraft price with a . . .



32 SEVENTH designed to carry 7,000 lb at 220 mph and sell for \$490,000.

## Canadair Plans DC-3 Replacement

Manitowishippi's latest bid to put a four-engine plane on the worldwide market is a replacement for the vintage Douglas DC-3 comes from Canadair Ltd., largest aircraft builder in Canada, and wholly owned subsidiary of General Dynamics Corp. (formerly Boeing-Best Co.) New York.

In contrast to a short 10 years the plane has, until now, maintained a constant market. It is handling 4-6 ft. (North American Douglas) and 13 ft. (Douglas) and 13 ft. (Douglas). It built the DC-3 under a Douglas license.

► **CL-21 Project**—Now the company wants to establish itself as a worldwide supplier of aircraft. The plane is currently being tested at Wright-Patterson AFB, Dayton, Ohio. It has a 13 ft. (Douglas) 9100 ft. piston engine, but Pratt & Whitney and Bristol engines are being considered for application. Pratt & Whitney is the most likely engine to be used in the Canadair CL-21.

Designed for local service operator short range, the plane's characteristics are intended to fit for medium

► **Performance**—The CL-21 will be approximately 540,000 at the factory. If a worldwide sale serves more reference indicates a good market for the plane, production quantities possible will give the full with production defects mean reducing life in 1954-15.

## Italy Set to Buy Training Planes

(McGraw-Hill World News)

Rome—The Italian Defense Ministry has laid out a policy for moving obsolete inventory and types of training planes to Europe through expansion of the Italian Air Force.

Plans are currently for procurement of 600 planes and 800 hours of training and an unspecified but fairly large number of jet planes. Of the latter, 30 Fiat-built DH Vampires and 10 Fiat G-90s have already been ordered. The G-90 is a two-seater aircraft, an improved DH G-90 is expected. (An additional 100 G-90s are expected to be ordered by the end of 1954.)

► **Trainer Orders**—Orders have been placed for 140 Macchi 430s and 140 Paggio 3-18 trainers. The former is a 4-engine design, which will be used in the latter's role. The latter is a 3-engine design, which will be used in the latter's role.

The latter is a 3-engine design, which will be used in the latter's role. The latter is a 3-engine design, which will be used in the latter's role.

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version of the remaining B-56 aircraft on order to B-56 configurations.

Such a decision would be logical because the B-56 could be phased in sooner due to less stringent production and testing problems. The B-52 would phase in as the B-56 contract phase in.

► **B-47 Replacement**—Meanwhile, the Boeing B-47 program continues to grow in importance to Strategic Air Command.

With more than 1,000 B-47 aircraft in use, the complex problem of maintaining them will be light. Replacing older bombers becomes increasingly important. Air Force is faced with even more problems of providing considerable numbers of aerial refuelers for these B-47s. It is considered that another plan for conversion to B-56 location in the B-52 and B-47s and B-47s to refueling tankers.

## PanAm's DC-6As

The three aircraft DC-6As bought by Pan American for trans-Atlantic service will run payloads of 25,000 lb as the long-range hop. PanAm

### Allied Air Strength in Europe

UNITED STATES AIR FORCES IN EUROPE (Lt Gen Louis Brinkley, CG)		ALLIED AIR FORCES, CENTRAL EUROPE (Lt Gen Louis Brinkley, CG)	
<b>U.S. 8th AIR FORCE</b> (Europe) Maj Gen H. H. Arnold, CG	<b>U.S. 9th AIR FORCE</b> (Europe) Maj Gen C. G. Brinkley, CG	<b>IN ALLIED TACTICAL AIR FORCE</b> (Europe) Maj Gen Dean C. Springer, CG	<b>IN ALLIED TACTICAL AIR FORCE</b> (Europe) Maj Gen Robert W. Floyd, CG
<b>8th AFW (F-84),</b> Comdant (25th AFW (F-84)) South Europe	<b>34th FFW (F-84D),</b> Finkenheerd 88th FFW (F-84D), Haukeberg (37th FFW (F-84D), Comdant 80th TFW (F-84D), Bogen/Mun 45th TFW (F-84D), Rheinwaller 17th TFW (F-84D), Toul (26th LFW (F-84D) Sarrebourg	<b>8th Airborne FFW</b> (F-84D) Ft. St. Venant Vincennes, F-84D PCAF Air Command (F-84D)	<b>RAF</b> Oxford (Venetian) BELLING AIR FORCE Oxford, Venetian, F-84D NETHERLAND AIR FORCE Breda, Venetian, F-84D

F-84 - F-84D Brinkley Wing  
 F-84 - F-84D Brinkley Wing  
 F-84 - F-84D Brinkley Wing  
 F-84 - F-84D Brinkley Wing  
 F-84 - F-84D Brinkley Wing

## By William Kruger

There are sufficient roads and rail-

Here in this ancient German resort town, the headquarters of the United

### Organization

• **Functions**—The Thief's main function is to support SAC's 7th Air Division. It is small now, one F35 wing and one F34E wing (more to be received).

The Ford, at the opinion of USAF people, is faster than most Allied planes in Europe (the Vampire may have a slight speed edge). It is rugged, packs a heavy bomb/rocket load, is dependable, and has a longer range than any other jet fighter in Europe.

Smith and other high-ranking officers strike a bargain: if the jet engine is still very new and they let me, [Smith] about 10 years later. The officer in charge of operations puts it this way: "That engine is the F-4 you can about 7,500 lb static thrust. So you can at 5,000 lb thrust. At 550 mph, that's 12,000 hp—more than we ever demand of. We don't have anything about that kind of power. No wonder we have trouble."

► **Troobler**—As if to prove the point

But on cross-country in West Germany, even the importance of language plays a role. The target of the thousand-mile march was the MeG's posted toward the 12th Air Force.

Gov. Stroger makes the point, for instance, that in the last year after the Dec 8 surge, 99% of U.S. troops never saw "an enemy plane" and can't agree on what it is, so he berated and stridently questioned officials. You also get the feeling that the F-8s would not be used seriously, for troop support, but would take advantage of



**GEN STRONHILL** We're right minutes away. But



#### PARAPLANE PRODUCTION PLANNED

Lotus' Laser Paraplane in flight shows the redesigned tail, new 25% chord wings and longer nose. The Paraplane III is designed to take off in less than 130 ft. in soft soil landing

100 ft. from hangar and climb to 225 ft. The spousal seat is slated to go into production this year in a new factory in Fremont, Calif. First planes will cost under \$5,000.

their long legs to stride behind enemy lines of infantry and fast drops.

The overall impression of an observer is that at least in the early stages of a war the U.S. Army in Germany would take a terrific beating from enemy air. A big question is whether the same would be true of our Air Force.

The F-4s of the Twelfth Air Force are short, stout, smart and fast. Their commanders cannot linger that the MIG wants it only eight minutes away. Gen. Strother finds it a serious situation, but not hopeless.

► **A Parable:** You remember the story about Gen. Nathan Bedford Forrest? He asks: "He was fighting the battle of Shiloh and had to hold a hedge. A soldier came up and said, 'General, they're attacking on our left flank,' and Forrest told him to go back there and fight them. Pretty soon another soldier comes up and says, 'General, they're on our right flank.' Forrest says his back to right. Then another soldier runs up and says, 'General, they're on our rear.' Forrest said, 'We're on there, aren't we?'"

The general pulls on his pipe and delivers his punch line: "We're only minutes away from them, too."

## Braniff, MCA May Be First to Merge

If stockholders agree, Braniff Airways will be the first domestic line to purchase another airline since Western bought TWA back in 1946. CAB has approved the proposed Mid-Continent deal where Braniff would buy MCA by giving stockholders one share Braniff for every 14 shares which Mid-Continent held.

But the Board conditioned its approval on Braniff's signing adequate guarantees of employee protection.

This is record time for a merger to

get approval of CAB—four months to a day from the original application (Jan. 24). Other merger proposals have had longer pangs. Northwest anxiety specialists blocked merger with Capital and NWA withdrew its merger application. Colonial minority holders stopped a deal with National. Delta-Northeast merger proposed but a unique non-voting route. Delta-CGS is a new proposal.

## Increased NACA Program Is Out

National Advisory Committee for Aeronautics' plan for a stepped-up program over the coming year are flat. This question now is whether NACA operations can maintain at this year's level—or must be reduced.

The \$64-million appropriation allowed by the House for the 1955 fiscal year, which would require NACA to cut its staff starting July 1, has been opposed by the Senate Appropriations Committee to \$68.3 million to permit a continuation of activities at the present level. NACA requested a \$79.5 million budget. Conferees of the two houses will decide between the House and Senate figures.

Both House and Senate Appropriations Committees considered \$17.7 million less than the \$207 million asked by NACA.

The construction houses (51 million to negotiate existing contracts) will go for conversion of the 39th project toward the dynamic model testing and a high-temperature structural research laboratory at Langley AFB, \$31.3 million; high pressure air supply and distribution system and expansion of air facilities for full-scale jet engine research at Lewis Laboratory, \$5.6 million.

## Intensive Missile Research Need Cited

The United States must go all-out in the research, development and production of guided missiles if this nation and its way of life are to survive, according to J. H. "Duke" Kadelberger, North American Aviation chairman.

In an address before the Aerospace Club of Detroit, Kadelberger declared: "Flying machines are simply approaching capabilities that we perceived rather than aided by the position of a human pilot." So complex and so fast have guided air aircraft become, he said, that aircraft manufacturers now have to provide extra-appeal not only for the pilot's comfort but his life. "The pilot's back has to be cooled, warmed and must be kept comfortable by an artificial atmosphere."

► **Pilot Problems:** Because the pilot's senses are not sufficiently acute and his reaction time not sufficiently fast enough to enable him to guide the machine in all the split-second phases of its military mission, devices must be installed which not only control the plane automatically but state exactly and space informing the pilot what the machine already has been told.

Accordingly, we are being forced closer and closer to the concept of having the pilot act a concept that has been fundamental to modern line of development that started in Germany and has been vigorously carried forward since the U.S. and, so far, more slowly moving in Russia. In these early stages of development there is clearly discernible the ultimate shape of air power (the guided missile)."

► **Development Needs:** Kadelberger indicated that we already have the "hardware." To make this hardware really useful requires, but that guidance for the machine is not so far along.

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Boundless speed and terrific lifting power make the Hopeful Aviation Corporation's F-84F Thunderjet a formidable addition to the U.S. Air Force's new jet fighting team. The optical properties of its Swedlow made transparent enclosures contribute to the efficiency with which this versatile fighting machine can perform in action.

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## BIGGEST FRENCH AIRLINER STARTS SERVICE

SE 210A Airplane, dubbed one of the colors of Transportes Aereos Intercontinentales, has started in Paris-Comblains Paris service.

Powered by four PW 4 R560 engines, the SE-210A can seat over 100 passengers and carries over 165,000 lb., making it the largest

aircraft transport in the world. Top speed is approximately 330 mph. The air line "don't" come out in the prototype.



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GENERAL ELECTRIC

21-1

## AERONAUTICAL ENGINEERING

### Rocket Model Does Work of Windtunnel

- Telemetered missile gives accurate data.
- And because it's cheap, method shows promise.

By George L. Christman

North Hollywood, Calif.—A rocket-powered vehicle carrying a scale-model wing of one of Navy's latest delta delta-type craft is being used in an inexpensive and effective means of obtaining various types of flight information. The model carries instruments for measuring aerodynamic drag and lift and built by Bendix Aviation Corp.'s Pacific Division.

Although space in the model is cramped, it provides data on eight channels, and this can be increased to 14, Bendix says.

Model Advantages—The model system should soon give water acceptance or solving expensive details problems, Bendix believes. Here are some of the reasons, as outlined by R. G. Hoof, the company's aerodynamic manager.

• No windtunnels. The model consists of a standard 5-m. military rocket with the scale model wing of the plane under study attached near the tail. The rocket is fired and telemetry directed data back to the ground, characterizing the need for windtunnel tests.

Implications of this new method are exciting. It will be possible to repeat the procurement of flight data without awaiting additional equipment and construction expensive windtunnels. Capacity of present tunnels, with their lower loading of work, will not be further stressed.

The model method of performance is not so expensive as is that of operating a windtunnel, and gives more accurate data, Bendix says, because transient choking effects tend to distort true performance criteria. The free-flight model gives a more perfect solution of flight characteristics of the air face under test.

• Inexpensive body. Standard military rockets provide the base of the vehicle and these are, relatively, inexpensive and easy to obtain.

• Versatile trajectory. Trajectories of the model's flight can be varied at the launching platform. Thus, Hoof points out, is a distinct advantage of the self-powered model over drop-type models. Trajectories of drop models made in low



SCALE MODEL WING of delta fighter is fired near tail of 5-m. rocket for



FLIGHT TESTS which are telescoped to show ground record taken using



EQUIPMENT built by Bendix that gathers data from eight channels simultaneously



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REINOLD PACHTIG's equipment line includes packaged hydraulic system (left) for guided missiles and electro-hydraulic power unit (right) for engine drives.

speeds at high altitudes and high speeds at low altitudes, usually the opposite of operating sea planes.

• **Variable flight path.** "Laser operated programming control moves various in flight to alter the model's path. Although the model cannot be controlled from the ground, the programmer is an expensive, expendable, easy to replace, and light equipped to make control."

• **Speedy Solutions—Speed in solving particular flight problems as they develop on the actual aircraft is a major advantage of the model method. There's a model to test a specific aircraft characteristic can be built, instrumented and fired within four to six weeks from the time the project is started. As he puts it, "You could have checked your search problem by the time a wind tunnel became available." And, the need for large numbers of highly skilled personnel is reduced considerably.**

Here are the measurements consistently taken—back to earth by the Bendix-Pacific equipment:

- Run or program
- Longitudinal acceleration and deceleration
- Yaw and pitch accelerations
- Amplitude and frequency of wing and control vibrations. (Different models have different flutter and vibration comparisons.)

• **Results Package—To make information on each reliability result and model's performance. Results had to be summarized already in manuscript form, according to R. J. Koss, aircraft sales representative.**

The North Hollywood manufacturer developed two packages used on the model which are contributing materials to the probability of the vehicle's test program.

• **Engine thrusts axial vibration package.** The first component, in the wing and the tail, measures only 4 in.



in diameter and is 1 1/2 in. long. Weight is less than 1 lb. Output of a solenoid port G is amplified to suitable pressures by an amplifier.

• **Minimum potentiometer.** Used to measure eleven for other surface control deflection, the measuring device's dimensions are listed as Weight is 1 lb. Bendix engineers say that this potentiometer is an exclusive development of them.

• **Telemeasuring Piloted Flight—Bendix spokesmen are expanding use for telemeasuring—one of their principal products.**

A new and interesting application promises suitable means in prototype aircraft flight time with control systems in case, effect and analysis of flight data.

Telemeasuring in flight information from piloted prototype planes could cut test flying time by one-third, Bendix engineers estimate.

In the current method of photo-recording flight performance with cameras in the airplane, the cost is paid through certain prescribed maneuvers. A model runs a cycle before the records

### Model Data

- Weight loaded . . . Approx 250 lb.
- Span . . . 3-4 ft.
- Length . . . 12 ft.
- Propulsion . . . Standard 5 in. solid propellant rocket
- Acceleration . . . 10-35 G maximum
- Rated speed . . . Reached in about 2 sec
- Max speed . . . Slightly over Mach 1
- Flight time . . . 20 sec average
- Distance of flight . . . 4-5 mi
- Cost of model, complete . . . Approx \$7,000 per model

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Furthermore, existing equipment can be utilized—Autopositive can be exposed in any blueprint or direct-process machine... and processed in standard photographic solutions. Hyter uses a blueprint

machine which has also been designed to produce Autopositive intermediates in a continuous flow.

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**For Drafting Room Short Cuts.** Autopositive Paper is used to reduce old and weak-lined drawings and to duplicate standard designs which will be incorporated in new drawings. All of which saves hours of constant drafting time.

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total contact amount is an astounding reflection on the high cost of aircraft today.

The largest portion of income tax returns are in the \$3,000 to \$1,500 income bracket. If you split this and assume the non-taxable average family of four, wife and one child, that typical family is a typical income bracket pays about \$225 in taxes. That one family consumes about 24 8-oz. bottles.

To pay for the complete package contract would take 27,412 such families at a hypothetical city of 82,216 population. This is somewhat larger than Portland, Me., or Springfield, Ill., and a little smaller than East St. Louis, Mo. And there is every prospect that there will be more contracts to replace these packages when they are worn. Suppose you took the 16 ounces and studied a bushing cap to slow down the R & D—wouldn't it probably be more economical over the years? —DAA

## Aluminum Plate at Room Temperature

A new practical process for electrodepositing aluminum at room temperature has been worked out by the National Bureau of Standards. Application is expected to be in the electroforming of articles with close inside tolerances, such as wire guides, and for providing remote types of equipment with a thin protective coating of aluminum.

Alloys, dyes, chemical deposits of the metal are being obtained at the Bureau from an organic plating bath consisting of an alloy solution of aluminum chloride and a metal hydride. The procedure was developed at NBS by D. E. Calkins and Nelson Brannen.

The study is being extended to develop methods for depositing in good physical form such metals as antimony, bismuth, tin, zinc, and iron.

## Steel Not Weakened By New Chrome Plate

Chrome plated steel parts subjected to fatigue loads have been designed conservatively in the past because of the known reduction in fatigue strength due to plating. Data recently developed plating solutions (Unichrome 50015 CR110) generates to eliminate much of the need for overstrength design.

Typical example of saving: If a part were to be plated with 0.001 in. of chromium from sulfate solutions, the stress versus area would be increased about 15% to account for the weaker ring by plating. If plating is done with the new solution, stress area is increased only about 5%.

These conclusions were reached from



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To: W. L. S.  
From: G. E. G.

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suffice the outfit to use in  
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much difference what we  
mean, they have it. And  
they seem to know what  
they're talking about, too.  
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both made at the University of Michigan by Paul M. J. Senne. Samples of aircraft quality SAF 4030 steel were heat treated to a hardness of Rockwell C50-H and tensile strength of 145,000 psi. This steel was fatigue tested directly to serve as control specimens. The other sets were chemically plated to deliver coatings and then tested.

Information about the tests of the Unimax solution is available from United Chromium, Inc., 380 E. 47 St., New York 17.



## This Gyro Knows Which End Was Up

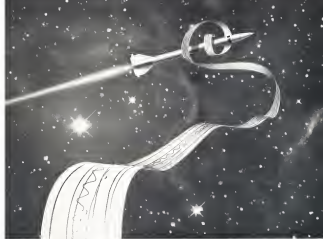
Some gyros can't remember which end was up, but the new navigable inertial gyro developed by Menzobols Hierarchy of Regulators Co. does.

The gyro, now at the start of a \$24-million production order for the Navy's Bureau of Aeronautics, will re-establish a vertical axis within two seconds after violent maneuvering of the aircraft has ended. Some of the current crop of gyros, says MHR, take as much as 20 seconds to remember which end was up.

Secret of the new gyro performance is a special latching gas which lets the gyro rotate without least axial slip of outer case and up to 55 deg. rotation about the outer case. Thus the gyro can spin freely as the pilot feels the airplane moving the舵, instead of precessing or locking. Many of today's gyros spin 18 or 15 deg. off center, says John V. Sigmond, MHR's chief sales planning engineer, and it takes about one minute of time per degree to come back to normal after maneuvers.

With the MHR gyro the pilot feels a switch after completing his maneuvers, and in two seconds the gyro is functioning again for guidance.

Sigmond says that the new gyro can be used for inside guidance (obviously not by itself) and substitution of radio scanning in addition to the external aircraft autopilot use. With modifications, it can also serve as a directional gyro.



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PROPULSION	B
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CONTROLS	C
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SI	

Guided missiles and their "report cards" have in the form of complex radio signals which are received and recorded permanently at the ground station. These records inform the missile engineers of his fourfold function in final route or point at the head of in case. Bendix Pacific airborne electronic systems and ground-based receiving systems have been streamlining and re-evaluating accurate report cards for guided missiles continuously since the beginning of the missile age.

The great number of Bendix Pacific electronic components and in person the guided missiles and aircraft used in this company, a leadership in the field of airborne electronics. Bendix Pacific standard microcircuit assemblies, radio equipment, radar control systems and electronic control components are designed for short advanced design, ultra compactness and reliability.

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Bendix Aerospace Corporation  
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**Bendix**

## Ceramics for Jet Use Put into Production



**SPRAYED** ceramic coats turbocharger inlet head (other methods of application are dipping and hand-brushing), preparing part to be...



**FIRED** at temperature of 1,150F. The high heat from left, clay and metallic oxide components of root in the back. After firing, parts are...



**STACKED** awaiting inspection and shipment. These turbocharger assemblies were part of the first production run through Bettenger's new plant.

- As yet it's a painstaking, intricate operation.
- But it extends life of parts two to six times.

High-temperature ceramic coatings have left the laboratory and are now being applied as a production line item, says the Bettenger Corp., Wellesley, Mass.

The firm's new facility, claimed to be the first production plant in the country devoted exclusively to these new coatings, is set up to apply any of the current ceramic coatings to any metal requiring protection.

Prime advantage of ceramic coatings is to extend the useful life of metal parts in a high-temperature environment. Life expectancy of a coated steel part is from two to six times that of an uncoated piece.

There's a secondary advantage—for a given design requirement of life or strength at high temperatures, ceramic coatings let you use a lower grade metal, saving on too grade critical alloys.

**Current Use**—Ceramic coatings are currently protecting aircraft exhaust systems, turbocharger-turbo pumps and combustion chamber liners in turbojets. Turbojet afterburners and turbine assemblies are being coated. Turbine blades have been coated experimentally in lots of several hundred. A broad possible applications to rocket and jet engines.

Previously, the ceramics which protect today's high-temperature turbines are among the most ancient materials used by man. For centuries artisans have protected pottery or cooking dishes with a fired coating of ceramic material which stood up under intense heat.

Within recent years there has been increased research and development work pointing the way toward efficiency increases in turbojet and gas-turbine engines. A large part of that research has been directed toward the development and evaluation of ceramic coatings as distinct from ceramic parts.

Ceramic coatings are attractive for immediate use. They are expected to extend the usefulness of alloys, with few, if any, design changes required for their use (Aircraft Week, Mar. 11, 1950, p. 21), from a paper by W. H. Dickson and J. E. Campbell, as-

Another Thompson "first"...

# T.P.M.

makes the big difference in valve life



T.P.M. VALVE

These two Thompson valves from Pratt and Whitney Aircraft R-4360 Engines were photographed after first overhaul.

T.P.M. is the new valve material developed by Thompson to give greater corrosion resistance and higher strength at valve operating temperatures. T.P.M. is a result of Thompson's vast experience in valve development and knowledge of the behavior of metals at high temperatures.

Other Thompson "firsts" include a new coating alloy for valve heads and faces, and steam-tempering to provide harder, more wear-resistant stem surfaces.

VALVE DIVISION  
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EGLIN, OHIO

YOU CAN COUNT ON THOMPSON  
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# LEAKAGE ZERO



ACTUAL SIZE

**Cornelius**  
AIR-CHECK  
VALVES

Illustration shows construction of straight-through design valves. Covers and disc seated, free flow of air. Cornelius Air-Check Valves have 1/4" flow capacity with standard pressure drop.



Illustration shows position of poppet under high differential pressure condition. Note the seal is held up as well as the rubber seat.



Illustration shows position of poppet under low differential pressure condition. Differential poppet and rubber seat provide a positive leakage seal with differential pressure as low as 0.5 PSI.

Leakage Zero up to 4500 PSI

Working Pressure 3000 PSI

Proof Pressure 4500 PSI

Burst Pressure 7500 PSI

Weight 0.07 lb. aluminum; 0.16 lb. stainless steel (optional)

Ports per ANSI 10056 for 1/4" tube. Other sizes and parts per ANSI 10056 available

Temperature range -62° to +200°F.

Performance features such as leakage zero—"leak-tight through," unobstructed airflow—dependable service under high conditions make the Cornelius Air-Check Valve an outstanding and designed specifically for pneumatic service.

Let us help you with your pneumatic system developments. Detailed and cost-free specific data sheets.

**THE CORNELIUS COMPANY**  
MINNEAPOLIS 12, MINNESOTA

Pioneers in Developing Pneumatic Systems  
(see Aeronautics)

## SPECIFY CORNELIUS PNEUMATIC EQUIPMENT



instant operation of Battle Mountain Industries)

► **Cosmics DeLund**—A typical cosmic coating applied by DeLund is a refractory glass material fused to the surface of the part to be protected. Small pieces of glass (called "hot"), clay, metallic oxides and other substances make up the coating. Fusion of coating to the metal surface takes place in a furnace at 1,875°.

Together these coatings—about 0.001 in. thick—have the same coefficient of expansion as the base metal. They resist high temperatures, protecting the base metal and extending its life. They protect static or moving parts equally well, and grow with castings or other forms, as parts such as turbine blades. They withstand thermal shock.

As a result of research and applied development, two general classes of cosmic coatings are most common now. One is the A-418 and Solignum series, used for coating metal alloys such as Inconel, Nimonic 75 and Hastelloy B. The second is the A-19 series, used for coating mild steel and the Inconel alloys.

► **Citizins**—These are more tools of the cosmic coating trade, starting with the initial choice of material and going through final inspection.

Which material was selected for coating depends on three things:

► Degree of protection, desired by engineering, temperature, strength requirements and life expectancy.

► Material to be coated. For example, requirements for coating of low-carbon steels and the high-strength alloys are diametrically opposed. In low-carbon steels, the coating must fuse early in the heating cycle to seal off oxygen and prevent too much oxidation on the metal. On high-strength alloys, fusion must be delayed until additional metal oxide is formed to generate good adhesion.

► Conditions of operation, defined by the loading cycle or the service of the part. The coatings must match the expansion of the base metals, show heat stability and have a slow rate of suboxide action on the metal.

► Into the Lab—The inherent abilities of these coatings have been discovered through experience tests and experimental applications applied in the extensive work of Solar Aircraft Corp., as well as others in the aircraft field.

DeLund also maintains laboratories where a large amount of development work is done for a number of customers, and where primary control and test experiments are made. Test pieces have been heated to 1,875° and plunged into cold water time after time to check thermal shock resistance. Only after many repeated tests is there any sign of failure in the cosmic coating.

Other test specimens have been



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Now you can have a lightweight, continuous-duty, explosion-proof motor. This new construction in integral horsepower ratings represents another Westinghouse first in the Aviation Industry.

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pounds. They are available with standard AND mounting pads or with special mounting. Radio noise filters are installed. This new design has been explosion-proof tested according to USAF specifications.

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## Three Million GCA Landings

**No GCA Failures!...No Plane Crashes**

Even to the planner Gilfillan engineer of 40 years ago, the low-mile economy and reliability of today's GCA radar might have seemed an impossible dream.

More than three million military and civil aircraft have been safely landed by Gilfillan GCA radar United States Air Force and Civil Aeronautics Administration records confirm that Gilfillan GCA has never been responsible for an aircraft accident. It is a remarkable record.

No small part of this record is the small amount of GCA outage for maintenance. 5 civilian GCA equipments have been in continuous 24-hour operation for an aggregate of 12 years. This means 12 years of continuous use for 4,000 tubes — yet only 23 have had to be replaced! This believe-it-or-not economy is a tribute to Gilfillan

radar design experience and to excellent CAA maintenance.

Gilfillan GCA is the only radar landing system in operation at the 8 largest civil airports in the United States. Since 1946 civilian pilots alone have made 106,000 landings using Gilfillan GCA exclusively at these civil airports. Of these, 70 have been "waves" at almost no distance.

Gilfillan GCA is in operation at civil and military airports in 26 countries throughout the world.



**Gilfillan**  
LOS ANGELES

\*CAA Record 4/12/58 \*\*CAA Record 1/1/58

hanted briefly and rapidly at temperatures as high as 1,600° (about nine times those temperatures in jet engines) and have taken the strain. Tracks of erosion-resistant turbine blades have evidenced the ability of the coating to take blade growth at high temperatures.

Out of the Lab—A production plant for coating is considerably different from an experimental setup. Bettridge needed both additional space and versatile equipment. In the space of six weeks and at a cost of about \$100,000 Bettridge erected and put into operation a completely separate factory next to their Wilkins plant, with special and expensive machinery developed for high-temperature coatings.

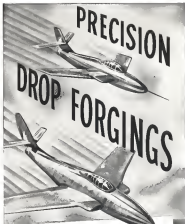
Now Bettridge is set for full-scale production. Bulk of the firm's current work is development and experiments; there is no large backlog of unfilled orders. That a customer would not have to wait very long to start receiving deliveries of coated parts, says the company. "We can take steady flow and deliver steady flow. Once they get pipe heat fitted they can get duty as heavily delivered if necessary."

Parts which enter the plant for coating go through a standardized production routine. At some indication of the processing time involved, you can consider that a single group of parts would be cycled in a single eight-hour day. The time for processing varies with the type of part and quantity, and order size; time is a definite factor in some work.

Production Pattern—The full pattern of production routine is a part a little like this:

- **Soaking**, a slow process at a temperature of 1,600°
- **Pickling**, meaning the parts through an acid bath, a hydrochloric solution, a drying period and a second acid bath
- **Baking off**, a few minute exposure to 1,575° temperature to burn the acids off the parts
- **Sandblasting**, for preparation of the surface
- **Application of coating**, either by dipping or spraying. Where a part must be coated by both techniques, dipping comes first. Before the spraying, aluminum coating from the dip is brushed off.
- **Finishing of the coating**, done in furnace at 1,875°
- **Inspection**, which is over and above the continuous in-process inspection.

A further word about inspection. It is based on visual standards and experience with the places that go wrong. During processing there is almost constant inspection of parts and coating composition. The parts are subjected to spot checks for thermal and oxidation cell shock. Bettridge cycles a flow of test pieces through routine processing at



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**Sanctuary of the Skies**—From the battle lines in Korea to the 60-foot platform on the Navy hospital ship *Comandante*, anchored off shore is a routine flight for the Sikorsky H-5 helicopter. During a six weeks' test last winter, this craft was a part of a flying ambulance shuttle of Air Force, Navy and Marine helicopters that evacuated some 430 wounded from Korea.

These earlier helicopters clearly showed how hours and even whole days could be saved in transporting casualties. Again and again, where shore medical facilities were

limited and the weather would have been too rough for the small boats ordinarily used, helicopters transported their human cargo in comfort and unobtrusiveness to these efficient havens afloat. The result of this test—the Navy has adopted this mode of transfer as Standard Operating Procedure.

Thus again, Sikorsky helicopters have helped forge another link in the life-saving chain they pioneered in Korea... a chain which has already accounted for the rescue of thousands.

**SIKORSKY AIRCRAFT**

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ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

controls for production. The occupation of the coating is simplified and checked periodically.

If parts are unsatisfactory, they can be rejected by stopping the conveyor and reprocessing. But only one aircraft is affected because of the possibility that the recycling will leave the line stalled.

► **Field Repair**—It is possible to substitute or grind parts after they have been coated, most of Bettinger's current production is so treated. Because of this versatility after treating, there is some indication that these coatings can be repaired in the field. This would not apply to large areas of complicated parts, but to small spots with signs of wear or damage. In practice the part can be cleaned locally and the heating coating applied.

Bettinger is performing some interesting current research on the number of times a part can be recoated after use. The job involves coating, new parts, running them and removing them. The cycle is repeated until there is evidence of failure or that nothing will be gained by further recoating.

It is more difficult to coat metals which have been used without coating. This is because of the action of corrosion at least on the surface structure of the metal parts. Preparing the surface is time-consuming, but Bettinger says that if it is so necessary to do the work involved if it means saving the piece or extending its useful life.

So it seems that both new and old parts stand to be improved through the use of ceramic coatings. And in those days of ascent as noncritical materials, Bettinger's new production facility can mean the saving of pounds of costly cobalt-chromium, titanium, molybdenum and steel.

—DAA

## Airframe Workers Double Pre-Korea

Airframe manufacturing plant on the west coast has more than doubled since Korea—latest figures from the Dept. of Labor show the work done as of Feb. 28, 1951, totaled 775,000, compared with the pre-Korea figure of 370,000.

But the industry has been lacking out its employment rate because of the decision to stretch out defense production. Having in January was below the level of the preceding 18 months, although highly skilled workers, draftsmen and engineers still were short.

Rate of military operations of factory workers from their jobs has decreased by about one-third over the past year. This reflects reductions in the manpower requirements of the armed forces following recent buildup in military strength in the East year after the Korean outbreak.

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## Multi-Use Grinder Tilts, Turns

A grinding machine displaying more design versatility than ever before in this type equipment and design is the "most versatile on the market today," has been introduced by George F. Grant Co., Inc.

The novel grinder has a single belt, but can be used for grinding and polishing, too. It "converts" easily... features that any three "grinders now come" easily meet, Grant claims.

Several contact points on the unit for different kinds of work are located at intervals around the circumference of the belt, making it possible for more than one operator to use it at the same time.

The belt can be tilted at various angles and rotated a full 160 deg. on a horizontal plane, locked at 90 deg. intervals. It can be moved from horizontal to vertical to perpendicular—so that an operator doesn't have to go to another machine to complete a particular job. Special attachments—discs—allow—

perpet small parts to be ground internally from 1/8 to 2 in. in.

The machine incorporates some of the latest developments in the grinding field, among them the serrated contact wheel introduced not long ago to increase belt life and ease grinding efficiency. New adjustable tension control compensates for variations in belt length that might result from stretching in atmospheric conditions and other causes.

The control gives smoother cutting and prevents belt breakage under heavy loads, the company says.

At the end of the belt, the operator can carry out custom wheel grinding; at the other, radius grinding from 1/8 to 1 in. A flat plate inside the belt and permits flat grinding. Work on cones and conical surfaces can be done at another point. The machine is regularly built, using heavy castings and synthetic bearings for maximum rigidity.

George F. Grant Co., Inc., West Newton 63, Mass.

## Certificates Of Necessity

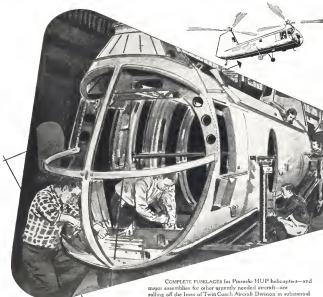
Accidental loss and destruction for manufacturers expanding their defense facilities is guarded by the government as the terms of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product of service, and the reconstruction deemed necessary for defense expansion but of no likely civilian use after the emergency, and the percentage of the expansion cost allowed for lost property. Last entry of permits lost property is deposited in any form.

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• American Airlines New York air transportation 10%  
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## Twin's Early Birds Build Whirly Birds



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no evidence that transistors waste power in the form of constant current biasing needed for the transistor circuit.

In Murray's electronic transistor power transceiver at 6.2 watts per stage, compared to an average of 3.0 watts for a typical standard tube stage, or 2.5 watts for an average miniature tube stage. In transconducting, he estimates that 2.5 watts per stage can be saved.

■ **Class as Reliability**—With as little transistor service life of 70 to 100 times that of a miniature vacuum tube, Dr. Murray thinks the transistors biggest contribution will come from increased equipment reliability. He believes that transistorizing 40% of today's avionics equipment would reduce equipment failures almost 80%.

■ **Show Transistor**—To achieve higher operating temperatures, transistors may have to be made of silicon instead of germanium. Dr. J. P. Jordan of General Electric predicted. At the moment, he is known about the properties and characteristics of silicon, and it may have other drawbacks.

Jordan said that cooling passive-type germanium transistors can handle power of 100 milliwatts, and if cooling is used, up to two watts. However, Jordan said that he feels that (passive) transistor power output should come from a larger transistor working area.



**TUBE-GENERATED HEAT** is conducted in thermal shield to assembly base and then to chassis for efficient dissipation in the Minneapolis-Honeywell assembly.

rather than from added cooling.

Long-lived transistors should extend the life of avionics and computers in computer applications, according to J. H. Peller of Bell Telephone Labs. Resistors and capacitors will operate at lower voltages and currents, thereby increasing their life.

■ **Magnetic Amplifier**—The magnetic amplifier hasn't removed the publicity given the transistor, but the mag-amp (as it is sometimes called) is a fast growing threat to vacuum tubes. The mag-amp will complement rather than compete with the transistor. The transistor is presently limited to low-power uses, the mag-amp is well suited to high-

power uses.

Presently, the mag-amp is a sizeable device and as such has been long known. The Germans and Soviets dug it up during the last war to power their vacuum tube shortage and advanced the art considerably. Engineers in this country are rapidly turning to the mag-amp because it provides a much longer, more reliable service life than vacuum tubes.

Engineers have four major advantages told of their magnetic amplifier services at the IRE conference.

- **Wattage-base**—An suboptimal active amplifier all magnetic.
- **Minneapolis-Honeywell**—A. remote



**AUTOPLOT AMPLIFIER** built by Westinghouse contains no vacuum tubes. Magnetron amplifiers are used throughout the assembly. Chassis which is shown above contains three separate autoplot channels.

powering system serve amplifier, all magnetic.

■ **Bell Laboratories**—An autotransformer-type servo system for computers, map rate amplifier output stage.

■ **W. L. Messer Co.**—Voltage and frequency regulator for 400-cycle inverters using entirely magnetic amplifiers.

■ **Mag-amp Attention**—According to the IRE speaker, here's what makes the magnetic amplifier so attractive for avionics equipment.

■ **Reliability and long life** due to rugged (perforated) type construction.

■ **No filament heater required**, hence no warm-up time.

■ **Reduced power consumption and heat dissipation** because of no filament heater and because mag-amp linearity is a variable resistance device instead of variable resistance device (a past resistance consumes no power). Dr. B. Klossner at MIT cited comparison figures for a magnetic and tube amplifier designed for the same job. The mag-amp's steady-state loss was 1/5, and full load was 1/4, of tube amplifier power consumption.

■ **Lighter weight** for power output greater than 5 w, possible for power less than 1 w, according to Klossner.

■ **Mag-amp Drawbacks**—On the other side of the ledger, there are two drawbacks to magnetic amplifiers. One may be listed to have the other (a) universal (b) temperature limits. The dry plate coefficient used in mag-amp directly and presently limited to a maximum temperature of about 150°F. Higher temperature coefficients are presently under development.

■ **Power frequency response**. Response time of a mag-amp has a theoretical

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Operated by the USAF's Air Research and Development Command, the Missile Test Center is geared up to test the wide variety of missiles, rockets and pilotless aircraft vital to modern air power. It reached its full stature with the recent completion of down range observation missions. And the dramatic B-50 pilotless bomber, the Mariner, designed and produced by Martin as part of its diversified missiles program, was the first to use the completed range. Test Groups 1, Maxey, Corcoran, Baltimore 3, Maryland.

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Naval Air Station • 400 Route 1, Santa Monica, California • 400 Route 1, Santa Monica, California • 400 Route 1, Santa Monica, California

continuous cut cycle of the supply frequency (1/400 sec for a 400 cps supply). If suddenly high gains are desired, response time gets longer. (At low source to drive frequencies, a vacuum tube is considered to have zero response time.)

■ **Autopilot Amplifier**—The Working Instruments magnetic servo amplifier is designed for use on their new 6-9 autopilot. It contains three separate channels (adder, motor, elevator) each of which uses three planar type motor units measuring 3/4 x 1 1/4 in. dia. The output of each channel is 10 mV, according to J. S. Mahak, who described the unit.

The amplifier output excites a coil and valve which in turn ports fluid to a hydraulic servo, a separate valve and servo, preferably, is used for each control surface.

Mahak predicted that the use of low power level mag amps could be adopted in much sensitive tube servos. For further indication he suggested using a higher ac supply source frequency or natural frequency amplifiers.

Mahak said that new types of low impedance systems are needed in test and simulators for low impedance amplifiers. The control circuit required in magnetic amplifiers present high impedance nonlinearities. He suggested the use of a variable reactance pickup using a permanent magnet rotor.

■ **Remote Positioning**—"What for with, and with gains required for most remote positioning distant magnetic amplifiers can compete in test and simulators with electronic transistors," D. B. Klosson of MIT and The generally low input impedance of mag amps is a big advantage when those pickup in the signal circuit is a problem. For example, magamps are readily suited for use with highly sensitive thermocouples.

Mag amps make natural d.c. amplifiers, Klosson said, generating the use of a d.c. signal circuit without "choppers" or other means of converting d.c. to a.c. If a d.c. signal cannot be used, he recommended a small d.c. modulator consisting of a thermal time-lag and a rectifier.

Klosson later demonstrated an all magnetic two-stage Class "A" magnetic amplifier operating a 40 mV B audio load. He said figures for the motor showing that frequency response is down 1 db at 1.4 cps; the 90 deg phase shift occurs at 1.3 cps.

The demonstration reportedly had a 50:1 modulation range with a rail shift of less than 5%. Klosson said linearity was good from zero to full 20 v. rail (90).

Magamps' extreme reliability and stability, to withstand shock should permit mounting them in inaccessible at-

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"CHOPPER" is synchronous vibrator has long proved unsatisfactory. Now Minuteman themselves has come up with a small 400-cycle vibrator (center), not much bigger than a cigarette. Older unit is shown at right.

place locations. Minuteman produced •Tubed vacuum-tube driver stages, which combine vacuum-tube driver stages with magnetic output stages, were described by H. A. Hahn and L. W. Stuenkel of Bell Labs. Bell has designed a tank of three amplifiers using identical driver stages with magnetic output stages of different ratings.

Each vacuum-tube driver consists of an i-c amplifier, phase detector, and phase inverter. The complete amplifier is then placed in a printed circuit assembly.

Hahn cautioned engineers that noise case is critical to match the impedance of the output stage and its 200-ohm a-c source, the output may develop torque and rotate when only its fixed phase is rotated.

The Minuteman output regulator, developed for a Jack and Harold oscillator will hold voltage within  $\pm 1$  volt and frequency within  $\pm 2$  cps. C. B. Grady noted.

System Reliability—"It (reliability) must be built in, designed in, checked in from start to hardware, manufacturing techniques and test procedures—these all contribute," says Minuteman of USA's Atomic Air Development Center told DAE members. The rapid engineers to develop more time and money to reliability during total equipment design to save maintenance costs later.

Minuteman emphasized that a small decrease in reliability of individual circuit elements results in a much larger decrease in overall system reliability. To illustrate this point, Minuteman cited three hypothetical systems containing 500, 1,000, and 2,000 vacuum tubes respectively. He further stressed that each system must be operable for 15 hours per day, with a one-hour shutdown for repair, plus, that only two faulty tubes could be located and re-



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## Fairchild Flying Boxcar Uses 32 Thermoswitch Units



IN THE C-119 FAIRCHILD "FLYING BOXCAR," hot air heats the crew's quarters and provides starting protection for wing and tail controls. Right wing heaters provide the hot air which is not so plentiful as a constant temperature. That job is effectively handled by 32 Fenwal THERMOSWITCH units — four to each heater.



QUANTITY PRODUCTION of Fenwal Aircraft Heater Controls (as shown in this picture) is accomplished by well-trained workmen who make up the assembly line. Their skill is backed up by top rated quality control methods which include X-ray inspection. Adequate and efficient production facilities keep all Fenwal THERMOSWITCH units moving in increasing quantities.



CLOSE-UP VIEW of a series of Fenwal THERMOSWITCH units have been used in flying Boxcars for nearly three years. Fenwal's proven their reliable performance, simple design and low cost. These Fenwal Temperature Control devices are especially developed for applications subject to adverse environmental and operational conditions.



OUTWAT VIEW of Fenwal THERMOSWITCH control shows advanced control contacts. The temperature-sensitive shell expands or contracts instantly with temperature changes, thus making it impossible for the complete Fenwal unit to be removed, highly resistant to shock, vibration and magnetic interference conditions. For complete data on these and other Fenwal aircraft controls, write FENWAL, INCORPORATED, 134 Pleasant Street, Allendale, Mass.



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placed during the one-hour shutdown. Here are the results: Mexican production.

Reliability of	System	Reliability
Each Tube	1000	1000
1.000	1.000	1.000
1.000	1.000	1.000
1.000	1.000	1.000

The table shows, for example, that if the reliability of each tube is 0.999 (1 tube out of 1,000 will fail), the 100-tube system will have a reliability of about 4.5.

In other words, it can be expected the system will operate most days out of every ten before it has more tube failures than can be located and fixed in the daily one-hour shutdown. The 1,000-tube system can be expected to operate only seven days out of ten, the 1,000-tube system can be expected to operate only three days out of ten with out system failure.

If individual tube reliability goes down to 0.995, the 1,000-tube system could be expected to be operating only 1 out of every 1,000 days.

► **The Solution:** In an engine system, reliability. Mexican rugged capacitors in addition. Mexican rugged capacitors in addition.

► **Reduce the number of tubes wherever possible.** If each tube, on the average, has a mean time between failure of 100,000 hours, the 1,000-tube system would have a mean time between failure of 100 hours.

► **Use conservative design of vacuum tube circuits in order that tubes will operate below their maximum rating.** (This would appear to be particularly odd with hot previous electronic.)

► **Build in test equipment to check operation of equipment and to repair malfunctions.**

► **Make heat reliable elements not available for replacement.**

► **Manufactured Construction:** Unless manufactured in a construction in which it becomes "a lot's work of equipment, completely unacceptable to even the most highly skilled technicians." D. G. Hinton of Executive For the Air Force. The answer he said is to break systems down into small circuit segments each of which performs a definite function and is very easily replaced usually in a plug-in module.

Hinton noted the use of plastic enclosures (preferred for small units). These, he said, should be accepted and applied, which, he said, fail. Potting prevents unauthorized tampering with (or even, which he called as important by product advantage).

He told of portions of an airborne computer circuit which was designed to be built in both potting and stand out for use for comparison. The potting unit compared favorably with the stand-out construction in terms of performance, except for the fact which was unknown at the time. However, the potting unit had heating problems; power densities were 812 times higher



LARGE PANELS, containing all the plane's engine built into modular type cases with provision for tubular cooling, have been suggested. They would be...



COMPLETELY REMOVABLE for test and overhaul. Air escape on fuselage (just ahead of opening) would provide means of cooling all the engine equipment.

from the standard construction, saving as high as 2,540 watts/cu ft.

To dissipate internal heat, Hinton talked of building the potting compartment with heat-conducting films. This could provide thermal conductivity equal to that of oil, but which oil can't compare with standard construction being forced on cooling, he said.

► **Cooling Problems:** Land-based heat removal is a major cause of avionics equipment failure. J. P. Welch, Cornell Aeronautical Lab, told the IRE. Even use heat-sharpening tube like by allowing gas in the tube and by cutting down resistance.

High heat also causes decomposition and dielectric failure in capacitors, resistors and insulating materials and in-

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[illegible]

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He called the vacuum tube itself the principle heat generator, actuated by resistant and radiative Schottky-type tubes can be cooled by using outer-henry electrical conductors to the tube terminals which will also serve as thermal conductors. Tight fitting tube shields with low thermal impedance conductors connecting them to the chamber are an other solution. However, Walsh and present authors tube shield design needs to be reviewed thoroughly.

• **Empirical Art**—There are so many unknown variables and such a scatter of data that it is almost impossible to solve thermal design problems in any exact manner by mathematical treatment. Welch said. As an alternative he suggested using simplified models to determine expected temperature gradients.

• **Turbulent Air Cooling**—A radically new approach to cooling various equipment which utilizes a basic cooling plate (heat sink) through which air is forced at a velocity sufficient to give turbulent flow, was described by Leonard Katz of Raytheon Mfg. Co.

\* Optimum air pressure differential for operation of the method is now believed to be 4 mm.

\* Detachable sockets facilitate cooling packages. Giving his engineers the run, Kato showed an aerial conception of a large turbolent air cooling plate containing modular components in which a variety of various components would fit. The entire package (including the range door of a military transport) would be installed to form a structural part of the plane, including the fuselage and a wing slightly forward of the "main" package, would provide cooling air to the main cooling plate. The

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Left: Cuno A-3 Impact Wrench driving 1/2" x 1/2" screws into outer table at Douglas Aircraft Company's Santa Monica plant.

## to fuselage assembly...

Right: Cuno E-3 Riveter driving rivets on fuselage assembly of Douglas DC-6 transport plane.



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will such controlled stresses perhaps might be located in various parts of the airplane. The use of such packages, Kato said, would solve the routing and shock mounting problems of individual aircraft equipment manufacturers.

•**Seabee Screw Amplifier**—Seabee's vibration technique, previously used in long-range level circuits, are being applied to servo systems. Minneapolis-Dowdell has designed a transformed power unit for their capacitor-type fuel gage which cuts the weight of its previous amplifier by 50% and size by 70%.

A. C. South of M-H described an ultra-sonic amplifier designed for operation at an ambient temperature of 200°. The tubes—a sodium iodide rectifier and pentode—are laminated in a small hermetically sealed unit. Each tube is surrounded by a metal clasp which acts as thermal conductor to the electric case and amplifier chassis. South also described a complete two-stage amplifier which is housed in a potted plug-in unit which is the size of transistor tube.

•**Shuttle Power Supply**—To reduce the size of power supplies, South suggested the use of lower than normal plate voltages in some sections where some distortion and non-linearity can be tolerated. This permits the use of capacitors rated at 200 volts instead of 450 or 600v units. South also suggested using auto transformers wherever possible to cut size and weight.

•**Subminiature Tubes**—M-H is concentrating on subminiature tubes in all new designs, South said. The only exception is output tubes where the miniature tube made is still used. However, South said that newly developed subminiature tubes of increased power rating may permit the use of two tubes tubes to replace one vacuum tube type output tube.

South suggested that at least one tube manufacturer is considering pressure-tube tubes with lead glass envelopes to withstand higher operating temperatures. These have a certificate with temperature rating of 450°.

M-H's work on subminiaturization, South said, is directed toward improved reliability, reduced size, and designs which are field widespread use in a variety of M-H aircraft systems. He said M-H is also studying the use of transistors and of hybrid electronic-mechanical amplifiers.

•**New Building Blocks**—New and improved counters, expanders, and indicators, the basic building blocks of many aircraft components, are on the way. C. B. Dwyer of WADC presented the picture that this type counter will eventually replace practically all our present counters.

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Reynolds Aluminum is on the job with literature and movies to help you with your personal training program—add to your own knowledge. The complete library of Reynolds Technical Books on aluminum design and fabrication is available to you for the asking. Please send your request on a business letterhead, otherwise the price of each book is one dollar.

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- **Aluminum Structural Design**
- **Designing with Aluminum** (Aluminum Extrusions)
- **Fastening Methods for Aluminum**
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- **SHAPE OF THINGS TO COME** (detailed description of the aluminum structure process and the design opportunities it provides. Running time 20 minutes.)
- **TALK OF THE FUTURE** (developments in aluminum products and construction applications in production and aluminum structure. Running time 22 minutes.)
- **PROS AND PROS** (the complete story of aluminum from mine to finished product. Covers all forms of aluminum. Running time 25 minutes.)

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## IRE Quotes

"Engines (designing engine equipment) must be checked into 'bulletin consciousness'." Cmdr M. A. Mason, head of BuAer's engine section discussing Navy's problems in keeping engine equipment operating.

"A rapidly changing wrought shaft . . . by poor radar radome construction . . . can severely limit the response of the missile servo system or aircraft computer, resulting in instability and oscillation."—Morton H. Tass, U. S. Naval Air Development Center, emphasizing the importance of radome design.

"Until the component manufacturer (resistor, capacitor, tube, etc.) can establish sufficient controls to guarantee the desired characteristics, the equipment manufacturer is obligated to integrate quality control (hardware) or service performance and reliability."—J. E. Rock, Raymond-Romac Engineering Products, Inc.

"Range performance of the newly announced AN/APG-42 (ray-trace radar) on land areas out to 195 miles over water is common, with range well beneath horizons written . . .  $\pm 1$  deg in azimuth and  $\pm 1$  mile in range."—F. C. Seifried, Radio Corporation of America

under USAF contract, has found that electrodes and cathodes of various metals can be used for flame sensitive films with zero temperature coefficient. They show an appreciable permanent change in resistance when exposed at ambient up to 2500° Doyle said.

Doyle predicted a bright future for several new vacuum elements, some of which are potential substitutes for vacuum tubes.

• **Thermistors.** Thermistors whose resistivity varies with temperature, have wide control.

• **Variators.** Elements whose resistance varies with voltage or polarity.

• **Triodes.**

• **Electronic amplifiers.** Certain cosmic detectors have a voltage coefficient of impedance. This non-linear characteristic could permit its use as an amplifying device. Thus, high impedance characteristics could complement the low impedance characteristics of the magnetic amplifier.

• **Non-linear magnetics.** These include magnetic amplifiers, ferro-magnetic transducers, magnetic modulation and pulse generators.

• **New Basis for Overhaul.** The Navy Bureau of Aeronautics may soon have factual data on the actual number of hours their aircraft equipment operates before failure. From this, they can establish suitable intervals for pulling various equipment out of service for preventive maintenance or overhaul. The source of the information will come from five 12 dia. x 1 1/2 in. clipped brass indicators weighing only 9 oz.

Cdr. M. A. Mason, head of BuAer's engine section, said that clipped brass indicators will be required on new engines, equipment developed for BuAer. Eventually, all indicators can be used in every major component of complex systems, Mason thinks the



FLAME-TEMPERATURE INDICATOR will be mandatory on future BuAer engine equipment, when it should help Navy in search for reliability. Used is about the size of a cigarette lighter.

equipment designer will benefit too, by knowing what limit of service life his equipment is giving.

At present the clipped brass indicators are available for operation only below 115 v., 400 cps. However, BuAer expects to develop indicators for d.c., and other a.c. frequencies.

• **Vital Statistics.** Over 1,000 engines and turbofans from all parts of the U. S., and from England and Canada attended the IRE conference. A total of 80 technical papers were presented plus two symposia on air navigation and traffic control progress and problems. Fifty live exhibits displayed these works on three floors of the Hotel Wisconsin, scene of the IRE conference.



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FOR

## AIRCRAFT ACCESSORY DRIVES

### Design Development Prototype Production Quantity Production

Just a few of the many drives produced by Western Gear Works for aircraft-engine accessories are illustrated on this page.

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## WHAT'S NEW

### Telling the Market

**Ready Guide for Specifying Aircraft** is a ready reference with design charts and sample torque tables of sizes, weights and quantities. Copies available from Midwest Rubber & Machine Co., Melrose, Conn. Data on industrial rubber hose assemblies for all types of aircraft equipment is obtainable by writing Carbic Rubber Co., Dept. L-1, 3rd Fl., Plaza, New York 7, N. Y.

**Small Gearing Tools of Extreme Precision** in an 18-page catalog describing 20 small units available from Woodruff & Niles Co., Inc., Building 38, 549 Lincoln St., Hingham, Mass.

**Practical Nickel Plating** is a 44-page publication for the designer, specifying capacities and size giving data on electroplating and details of nickel plating and its practice. Write Electrochemical Nickel Co., Inc., Dept. E2, New York 5.

**Handbook** gives information on valve design, valves, tubes and fittings and comparison with available hand tools. Calibration precision data is included. Write: Pacific & Power Co., Hattiesburg, Miss.

### Publications Received

**History of Marine Corps Aviation in World War II**, by Robert Starob, published by Casual Forces Press, Washington D. C. 1951. 160 pp. Robert Starob, Editor and Librarian, has written the story of the Marine aviation from the earliest days (1912) to the beginning of the war in Korea in June, 1950.

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*Produced by Joseph H. Hovde*

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made by other firms. Trans and heat exchangers are similar in heat transfer efficiency, volume, weight and pressure drop characteristics for fluid flowing over the surface. Trans engineers say: "Send 500 lb.—heat exchanger components are handled into an integral assembly by a fast-fitting method developed by Trans in World War II. The process is efficient, Trans says, but parts of it, compact, lightweight and efficient radiators, radiators and other components."

In one case, the development was responsible for a 500 lb. radiator in weight in a single-engine fighter plane, according to Trans.

**Production Steps**—First step in making the core is processing aluminum strip stock into corrugated, smoothed or other patterns desired. This is done on special stamping machines. The stock is coated with a heating alloy and it comes on into the next step.

The core elements are then combined with the sheet metal between, and other scheme necessary to make a complete assembly, and the next pre-heated to a point just below the melting point of the aluminum coating on the surface. The result is the pressure comes when the entire assembly is plunged into a

chamber and bath of flux heated close to the melting point of the aluminum itself. This is hot enough to make the aluminum coating run so that it bonds the flat sheets and corrugated fins into a rigid structure capable of withstanding test pressures of 500 to 600 psi and operating pressures ranging from 100 to 300 psi.

Very accurate control of flux heating, flux bath temperature (to make the melting point of the aluminum alloy) and cooling is necessary to success of the free forming process, the company says.

## NEW AVIATION PRODUCTS

### Aluminum Etch

A material for etching aluminum prior to anodizing, and in the performance an aluminum etch on the market today. It has been developed by the Jackson Chemical Co. of Calif. Inc.

The product can be used hot or cold, will etch the toughest alloys, including 615, the firm says. Maximum etching of some alloys aluminum etched with the material can reach twice that levels before, it claims.

The firm notes that a proper etch is essential dependent on proper cleaning parts to the etch and for this reason has introduced as a complete product, N-48 Alkaline Hot Tank Cleaner. But even with other cleaning materials, the new etch still is better than others now available, the company claims.

Jackson Chemical Co. of Calif., Inc.  
4910 S. Stanford Ave., Los Angeles 1



### Jet Air for Radar

A new processing jet for the latest radar which obtains its air supply from the compression section of the jet engine, has been developed by the Hottel Division of Inco, Inc.

The jet delivers air at a constant 20 psi, regardless of inlet pressures from the engine, or thrusts forces up to 90,000 lb. If an pressure from the jet is excessive it is dropped, through auto

matic regulation within the jet. This is provided by an automatic pressure switch and solenoid valves.

Inlet air, before it reaches the built-in dehydrator which cleans and dries the air, is kept at a pressure lower than required for control pressure, then built up accurately to required pressure by means of an air compressor also included in the jet. Final regulation of air pressure before it leaves the gun turret is in the pressure-rich-solvent control system so that in the inlet side of the jet.

The jet operates at rated performance through temperatures from  $-67^{\circ}\text{F.}$  to  $160^{\circ}\text{F.}$  produces 100 cu. in. of air/min.,

uses 27 v. d.c. current, draws 1.7 amp., and weighs 159 lb.

Hottel Division, Inco, Inc. 11th Ave., Ohio

### Steam Cleaner

A new steam cleaner to save money, time and labor in cleaning aircraft engines, nacelles, props, wings and landing gear has been introduced by Aero Products Co., Inc.

Aero's built-in development the Aero Steam, built it specially to meet any task needs. It can be used both in hangars and field and is particularly useful at airports, according to the firm.

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There are many more interesting features about the MB-3 available in our illustrated folder. We may include this publication when sending this folder. Inc., 2000 Eastern Avenue, Burbank, California

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The unit can be operated for as little as five hours. One filling of the one pound tank is sufficient for 5 hr. of continuous operation.

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Acetal Products Co., Inc. 5 Hickson Ave., N. Y.



## Gears Protected

A new bearing used for aircraft gear cases that shields helicopter rotors has been developed by Technical Development Co. for torque and axial service.

The unit makes up for possible differences needed when gear cases from changes in altitude or temperature. It provides air to pass freely in and out of the case, but prevents entry of grit from the outside and escape of oil from the inside, the company says.

Evaporation of grease is controlled to prevent damage to oil seals and formation of air pockets or oil leakage in the lubrication system. The unit weighs 34 lb., is made of heat-treated aluminum alloy to achieve specifications.

Technical Development Co., 22 Meredith St., Philadelphia 31.

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**Ratio-Screws** (stripping fasteners) drive weighing 5 lb. and rotatable 160 deg. left or right is suitable for driving various low torque mechanisms such as indicators, potentiometers, solenoids, synchros and transfer equipment. Device is aluminum-cased, normally rotating in 2-deg. increments. G. M. Garrison Co., Pasadena, Calif.

New dash latch for aircraft is designed for a variety of applications and is easily installed. The male exposed parts are fireproofed, have finger button and click buttons. It is made in various sizes, weighs 0.7 to 2 oz., according to material. Hubbell Aviation Supply Co., 9015 Venice Blvd., Los Angeles 34.

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PIIONEER BUILDERS OF NIGHT AND ALL-WEATHER FIGHTERS

## FINANCIAL

## PAA Gross Reaches All-Time Peak

Net profits also were higher than ever before, but taxes kept them from surpassing 1945 high mark.

An all-time gross revenue peak of more than \$155.5 million was reported by Pan American World Airways for 1973. This compares with a total gross of \$153.8 million in 1990.

While 1951 net profits, before taxes, of \$31,345,197 were also at an all time high, not netted after taxes, \$6,346,197, fell short of the record \$7,585,580 established in 1945. Earnings per share were about aggregated \$1.08 in 1951 compared to 65 cents in 1950 and the previous peak of \$1.23 in 1945.

A total of 50 cents a share, or \$3,005,522, was paid to shareholders during 1951. This represented the eleventh consecutive year in which dividends were paid. The same rate was paid in all years, excepting 1946 through 1949, when only 25 cents a share was paid.

► **Mail Effect**—Firm America's stock prices for 1991 and 1992, are for low

qualified than the amounts for prior years, which is included in gross income (company estimates for additional and pay not yet awarded by the Civil Aeronautics Board). Nevertheless, financial results for 1951 still contain a transition rate in view of pending and late proceedings which may ultimately serve to increase or decrease reported results for last year.

The same qualifications apply in varying degree to the published earnings of recent periods as well. Permanent and rates for the Atlantic division have yet to be established in various respects from Jan. 1, 1940. A permanent rate is pending for the Latin American division covering the period from Apr. 1, 1945. (Last year saw the establishment of permanent rates for the company's trans-Pacific and Alaskan operations.)

It is significant that in 1951 F&A's total net revenues—U.S. and foreign

lowland—aggregated but 20–40% of the  
current total. 2004. 03/03/2004

In 1970, the rate rose somewhat to 21.4%. Almost 51% came from the south in 1949. Ten years ago and earlier, reported mail increases accounted for anywhere from 50% to 60% of the total case increase.

★ **Passenger Effect**—This is nothing more than a collection of the increasing importance of non-aud revenues, particularly from passenger development. Hawaiian passenger rates reached a new high of 1.37 billion, an increase of 23% over 1950. Passenger revenues accounted more than \$100 million in 1951, set a new high, up from the \$87.8 million of 1950 and surpassing the previous mark of \$94.4 million in 1947.

The company's tourist-type service is eroded with much of this gain, as 10% of the total overseas passenger miles last year came from this source.

Net operating income before non-operating adjustments amounted to \$10,368,677 for 1951, three times as great as the \$3,393,360 reported for 1950. Non-operating income for 1951 was less, \$3,495,829 as compared to \$4,882,073, the main difference being accounted for by a decline in the net gain on the disposition of property from \$3,536,344 in 1950 to \$1,817,764

► **Financial Position**—An improving financial position is also reflected by the

1951 report: "A bank credit totaling \$19 million was made available to the company on Sept. 25, 1950. A portion of this credit was utilized to finance the purchase of American Shipways, Ashland Inc. \$17,454,000 in 1950. Total borrowings, which stood at \$52,750,000 on Dec. 31, 1950, were reduced to \$40,250,000 a year later. With a payment of \$6,248,000 on Mar. 31, 1952, total borrowings were down to \$34 million as of that date. Repayments are scheduled to continue semi-annually to Sept. 30, 1955."

At Dec. 31, 1953 Pan American had total commitments, approximately \$44.5 million for airplanes, against which advance payments of \$5,650,000 had been made. This capital requirement is represented by the order for 39 DC-6Bs (Pan American labels them Super-C Clippers). These commitments are expected to require cash of \$21.5 million in 1955. The company had other commitments for parts, materials, and services totaling \$13.5 million.

With 1952 depreciation charges reported to exceed the \$38.7 million shown for 1951, a considerable cash flow off should be available from the source to help meet those capital requirements. Debt retirement will entail another \$4,250,000 on Sept. 1, 1952.

and 514 million during 1953. Net work-  
ing capital aggregated almost 517.5 mil-

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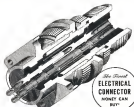
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## AIR TRANSPORT

# U. S. Aviation Switches to Knots July 1

- Airlines are ready, but join others in protest.
- Speed will be in knots, distance nautical miles.

By F. Lee Moore

"The aviation industry's going knots and nautical miles" (next month excepts the fact all national navigation systems and obstructions of the country—land systems, roads, mountains and 1,500 ft. TV towers—are located in terms of statute miles and are habitually approached in terms of mph. by all Americans but seamen and Navy pilots.

That is how one aviation industry representative pointed out results of the recent Civil Aeronautics Board hearing on the proposed July 1 switch over all official speed measure from mph to knots and distance, measured from statute to nautical miles.

Seems mph are in knots and seven statute miles are six nautical miles. Navy and Air Force wanted to stand-ardize on the nautical measure to avoid confusion. CAB consented.

Industry Attack—But at the CAB hearing, spokesman of every phase of real aviation launched strong but probably fruitless attacks on the CAB regulation.

What most disturbed industry spokesmen, especially the airline representatives, and two of the CAB members present (Donald Rein and Joseph Adams) was the fact that CAB had been committed to the change-over administratively, without consulting the industry. Then, they said, made the hearing, a sharp conversion to professional timidity and line.

Gen. Milton Amdahl, operations and engineering vice president of the airline ATA, put it this way. CAA and CAB told the industry last October at their Denver operations conference, in effect, that they had better start now converting instruments, manuals and procedures to knots and nautical miles now, because there would be a switch to these units July 1. The airlines complied.

Gen. Amdahl told the Board at the hearing that the airlines had put such heavy investment into the change that a Board reversal now would be worse than going through with the biggest administrative decision

The July 1 switch-over of U. S. official air navigation units to nautical miles and knots demands only one legal required change in pilot procedure. Pilots (in one airport class on visual contact VFR flights who may ask CAA personnel to consent for them) must communicate with CAA in terms of nautical miles and knots.

To make the conversion simple, airlines and their pilots plan carefully to make these changes. Air speed indication will be increased and their data changed to knot indications.

Navigation equipment, usually the Dufour, will be modified to read in knots only. Most Dufours in use now require one extra step to get the answer in statute miles and knots.

Flight manual, especially runway dimensions on small airports, weight and aircraft performance

data, must be converted. Some airlines plan first to insert conversion tables, later change the basic data.

Refuel and other navigation manuals, marked in statute miles only, will need replacement. But most of them have long carried both statute and nautical units.

Chart usage published by Coast & Geodetic Service are coming out with nautical mile measures now, most have, for some time, approach charts are now. Japan approach plates have been revised.

What is a knot?—It is a basic conversion data for statute to nautical distance speed unit. One statute mile is 1,760 ft. One nautical mile is 6,080 ft. or 1.15 times one statute mile, or one statute of latitude (one degree of latitude of one great circle curve equals 60 nautical miles).

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in doing operations to the north-east.

Utility Airplane Council Joseph Gering Jr., and there is no need for the thousands of thousands of local firms in the country to adopt an alien international standard. The standard is only used in England, great circle navigation, he added. The need the fact that the local statute level at the control U. S. is a round trip in statute miles. You can't change that. He pointed out. And now only through the normal road, it's like of thinking of mph. and statute miles in his daily life. He added.

"We suggest," Gering said, "that the international and uniform operation, one two standard, but that CAA and CAB let the domestic and industry use the statute mile. The statute mile also suggested that to make this work smoothly CAA should their traffic controller with a fifth reference conversion tables.

State Aviation Officials Representing the NTSB Col. A. B. McMillan and a member of the preparation of a "common value" that "there always has been only one standard in the U. S. — the statute mile." He added that he's recently been working on the problem of brevity for side letters of all TV

because "the FV tower locations are being measured in miles" and the aviation industry's going home," he says.

► **Indian Gauge.** Representing the Indian Air Corporation and the Indian Flying Farmers, Chas. Conway and the non-professional pilot thinks in miles, and he is frequently caught by the FAA's use of statute miles. "I am thinking from the statute mile habit would be "one more actual obstacle," he said.

► **Ascent Ocean.** Speaking for those who are members of the Ascent Ocean and Pilot's Union, Alvin Adams and J. B. Hartford, Jr., backed up the general aviation opposition to the limit.

► **Airlines Going Ahead.** Gen. Arnold said the airlines will probably be given expedited use on July 1, and the mental changeover shouldn't trouble the pilots much. Arnold's chief only came via the wire in which CMAI and the ACC decision was made. He is confident, and the members of the ACC have not yet said that there will be a unanimous vote of the desirability and the technical problem of making the conversion.

An Air Force memo did not participate in the local FAA Tower study, the ALFA executive board approved the south over police domination by the ACC.

► **Military Position.** Air Force Col. Johnson backed the CMAI regulations and problems with the military standard would be especially acute in case of a withdrawal. He cited troubles of maintaining part Navy Air Force operations in World War II, when the Navy Air Force was in the air. He cited the problems of integrating the Civil Air Patrol in search and rescue, when they were on ship and statute miles and the military on statute and statute miles.

And he cited the problem of reserve poles and towers involving from civil flight to military and back again. Finally, he noted the need for standardization of all transport planes of aircraft and Military Air Transport Services.

Pressed by CAB Chairman Donald Nepp, Col. Johnson couldn't detail AF plans to fit in large number of old planes still authorized for ship and statute miles. It appeared that the airlines are now ahead of the Air Force on actual statistics and standards. The column did say, however, that all AF plans back since 1946 have been believed in the military organization.

► **CAA Agreement.** CAA officials said the decision to change all miles and instrument flight operations to statute July 1.

The administration coordinator of the CAA planning staff, Dr. S. Symon, outlined CAA's position, making two main points:

- Cent is less on a one hour change over than the long range end of a dual system, one military and the other civil.
- Safety risk is less on a one hour adjustment than a long term double standard.

## Three Firms Build ATA Omni Models

Aircraft manufacturers are working into production and sales activity as recent laws on the low-cost terminal omnibus facility developed by Air Transport Association.

ATA completed evaluation tests on the acquisition and mechanical approach will only two months ago.

Aviation Week May 5, p. 68.

Knight-Ridder Co. is creating a prototype model through its plant now-being to have it ready for use in September this month. Many believe this model is just the vision the airlines want, but plans to actually build it, use some form of airline before producing a prototype.

► **Other Types.** Wilson Electric Co. is taking of some into full production without waiting for firm orders, may build 10.

Colson Radio Co. is building a prototype of Dallas.

Despite the standardization activity so soon after the birth of a new commercial product, Pan American World Airways couldn't wait. It has already had its standard building one dual unit for installation at Raleigh Field, Liberia.

Robinson Airlines plan to lease the ATA development model for airline use.

Other airlines eager to get models now. All American, Southwest and American Airlines (for its Mexico route).

► **Costs.** Marchand will produce a one prototype model (the ATA Model) estimated cost of its model at about \$10,000 complete with materials. This model is up to CAA specifications, doesn't look like a prototype.

ATA developed the prototype model to meet local service air line requirements, mainly. But points are that the international market may be the biggest.

Locators will be needed. Where an other aids are available for positive identification, approach, a one dual unit may be needed so airlines can make straight-in instrument approach on the omnibus. But where other aids are available, the one dual unit is not needed for an airport's standard service as well as negative approach on the air.

## Cabotage Privileges In Germany Continue

Gerald W. Schneider  
(McGraw-Hill World News)

Frankfurt—Foreign carriers applying airline service between cities in West Germany have been long time before their cabotage privileges will end, despite the peace contract which ended the Allied occupation of the Federal German Republic.

The peace treaty provides that Germany will permit an extension of any state to continue their operations, as cabotage, on a basis as less favorable than that covered by there at the time the peace treaty took effect (after ratification by the national legislative bodies of Britain, France, the U.S. and the German Republic).

Likewise, it is agreed that the provisions will not be withdrawn at least one year after the effective date of the peace contract, unless the new German state renounces any or all transport agreement with the country where either has the cabotage rights.

Other provisions of the treaty are not possible, but not possible now to end the cabotage rights sooner. Under the peace contract, Germany may withdraw the privilege when its own interest is able to provide adequate national service. This is not possible within a year.

Deals with most of state in the present cabotage agreement, as the Air France, British Transport Airways, Pan American, Sabena, Swissair and KLM. The peace contract also provides:

• Germany will abide by the terms of the International Civil Aviation Organization and as soon as possible will join ICAO.

• Aircraft of foreign companies will be extended some rights and privileges in use of air navigation and other facilities in Germany extended to its own aircraft.

• Air traffic to Berlin will continue to be controlled by the U.S., Britain and France.

• Not later than May 5, 1951, Germany will take full responsibility for aviation air traffic services, international and civil aviation investigation in the field of civil aviation.

## Bahamas Line Reorganizes

After three years of increasing losses and losses, Bahamas Airways, Nassau, one of BAC's smallest associated companies, is being reorganized.

It is an entirely domestic service under management separate from the Bah. Bah. can.

BAC is taking over the mail service, an international service, including the 200-ton liner from Nassau to Palm Beach, Fla., suspended service.

## Airline Mobilization Plans for Emergency Reserve

	Original program	New plan
Boeing Stearman	35	35
Boeing DC-4s	55	125
Boeing DC-6s	55	125
Boeing DC-7s	150	60
Total planes	360	360

Approximate numbers estimated by Aviation Week from information supplied by Defense Air Transport Administration and Air Force officials.

Note: Actual capacity of both dual plans is about the same, with DC-6 and C-47A figured at about twice the tonnage per day capacity of a DC-4.

## AF Transport Reserve Program

First contracts to airlines for modifying planes are expected this month; full details still undecided.

By the end of this month the airlines may have the first Air Force contract to modify their fleet to meet the needs of an airlift mobilization reserve.

But Air Force and Defense Air Transport Administration still haven't decided on how many of each type planes to modify first, and the long-term plan was not set at the time of the Pacific war.

Eventually, Air Force plans call for modification of all four-engine aircraft to airlines for long range airlift duty. But Air Force wants to get going on the first half of the mobilization program by early readiness with the rest later as budget allocations permit.

► **Revised Plan.** The DC-4, especially suited as the emergency airlift plane, they require modification to meet the new reserve plan, except for about 60 long-range DC-4s carrying little modification for airlift duty.

An Air Force official says AF has asked the civilian airlines to agree to substitute long-range DC-4s for C-47s for the short- and medium-range DC-4s is equally suited for modification to emergency airlift readiness. But in a CAA statement AF is quite the opposite. AF isn't making up its mind what it wants.

At the time, modification of a bare minimum of about 50 Stearman, DC-4s and C-47s is stated to start about July 1. Then when Air Force and DTA are set together on what to do about the DC-4s, modification of those planes will start.

When the DC-4 conversion is under way, attention of the remaining lift capacity demanded by Air Force will get ahead indications are that the latter will be in the area of about two-thirds DC-4s and one-third C-47s.

► **Estimates.** Through conversations with both DTA and Air Force personnel, Aviation Week has estimated the

approximate fleet composition estimated by Air Force (see box).

However, it's still not decided. Here are relative merits of the old plan, including modification of DC-4s to the new plan, including from DC-4s and C-47s.

► **DC-4 advantages.** If modified, new, include its better adaptability for cargo, and the fact that if Air Force needs more than the first- and second-line reserve it will need the DC-4s anyway. They take the longest time and the most equipment to bring up to long range over ocean (navigation standards).

► **DC-6 and C-47 advantages.** If modified, first they can be modified sooner, they require less time and less equipment to bring up to long range over ocean (navigation standards). They are faster, bigger and more efficient, they are becoming more and more the main standard in new delivery contracts, and, finally, Air Force doubts about the adaptability of modifying obsolescent aircraft (DC-6) that will be sold to foreign countries as U.S. DC-4s replace them with new aircraft.

► **Boeing.** Air Force and DTA already have decided to add new models, including for the short range DC-4s of 1,800-gal fuel capacity. New aircraft are in what about the medium-range DC-4s of less than 1,200 gal capacity.

## Airlines to Continue Family Fare Plan

Despite recent plans of domestic airlines for higher fares, they're holding onto the "family plan" which family, Club Eastern, has taken to mean the plan for another year in Northwest,

which says it won't add much on Northwest routes except for the State-Strategic routes, which doesn't cost that promotion anyway.

The family fare plan priorities based on generally week days of Monday, Tuesday and Wednesday.

Under the arrangement, a husband on his way home on Friday takes his family (how many) along at half fare. American Airlines promoted the plan, it worked as well as anything on the world's travel load that probably all airlines have used at some time.

► **Costs.** Domestic airlines charge airlines, one of the plan, however. United Air Lines recently proposed raising the family rate to three-quarters fare—had to retract when competitors didn't go along. New York State Rail Road Airlines dropped the plan this summer. Trans-Canada drops it every summer, because as the winter. Northwest Airlines dropped the plan this summer, because the fare had to be raised on weekends heavily, but plan to raise it when the shortage is over.

Civil Aeronautics Board started a general fare investigation in April, and airlines have been asked to cut but dropping the airline's plan for elimination of the 5% refund top discount. Fostering customer hasn't been held.

## Robinson Presents Case for Renewal

Bahamas Airlines, first local line recommended by a Civil Aeronautics Board report, is now in the air, but dropping the airline's plan for elimination of the 5% refund top discount. Fostering customer hasn't been held.

John Corbett noted that on the month of October, last year, Robinson was told by the Board for the highest number of persons planning current plans. Robinson's proposed service from Southwest and Piedmont and an average of 50, 50 if all DC-3s take loads.

Robinson's October traffic density, measured in passengers, generated per route mile was 16, compared with 10 for Piedmont, Southwest and Transair and no airlines average of 10 or less passengers.

And on the key index of money value, Robinson's money per route mile was 16, compared with 10 for Piedmont, Southwest and Transair and no airlines average of 10 or less passengers.

However, due to rising expenses the Board has to make the Board to make the plan as presently-effective fare and













## The Air Force Finds Its Voice

Fortunately for the country, the Air Force shown signs of awakening, although belatedly, to the realization that its own timidity and secrecy have helped politicians slash our air power far beyond limits of safety.

The danger signs were flying first about a year ago with the first cut in funds.

Then the so-called stretchout was concocted and the Air Force again limped down to the Truman job. At last the stretchout was presented merely as an delayed deferral; later it was conceded that important fighting aircraft had been eliminated from schedules completely. Some aircraft schedules had been unrealistic; it is true, but the stretchout did go beyond mere realistic modifications.

The Air Force high command—both civilian and military—formed—bowed to the Administration, however. The cautious flying tactics of a more informed Symposium on Capitol Hill to sell the need for air power—with persuasive facts—were sadly missed.

The congressional remedy were followed the Administration's lead.

Now, quoting ANTHONY WEXE's legislative report, Miss Katherine Johnson, "Secretary for Air Fulleter is taking the offensive in spelling out to congressmen just what cuts in funds mean in planes and striking air power." Why wasn't it done a year ago?

Now, Miss Johnson says, Mr. Fulleter is "turning the reins of the Administration's hold-down of Air Force expansion, heretofore kept within the family," as well as presenting reduction in the USAF program by the House."

A documented chronicle of how U. S. air power has been held back by White House and congressional slashes of funds, to the point where today's air power is being strangled at 80 combat wings—about two-thirds of what is needed today—was finally laid before the Senate Armed Services Committee last week by Mr. Fulleter.

It would be "highly desirable and not a case of over-caution," he told the Senate committee at a hearing of its Preparedness Subcommittee, if the 135-combat wing Air Force, ultimate goal of present planning, were in being today.

First advance blow at the USAF schedule to get a 145-wing Air Force, including 125 combat wings, by the end of fiscal 1954, came a year ago, with the failure to pass of a \$5 billion national emergency fund congressional appropriation needed to start the buildup from the 95-wing strength previously authorized. Fulleter reacted instead, a \$1-billion appropriation was passed, of which USAF was allotted \$667 million. This provided little more than a month of the fringed string for the 145-wing force, but throwing the overall plan behind schedule.

In phasing the 1953 budget request, the Secretary said, buildup to 140 wings (135 combat wings) authorized by Joint Chiefs of Staff, civilian secretaries of the Defense Department and President Truman, was

"sought." Despite the previous failure of five-fifths of the national emergency fund, the Air Force planned decided that with partial financing in the first part of calendar 1952 and enough funds in 1953 and subsequent years, the desired numbers date at the end of fiscal 1954 could be almost reached.

A three-part program was planned by Gen. Hoyt S. Vandenberg and Fulleter to hold down expenditures.

First proposal of the air staff was for a \$10.7-billion 1953 Air Force budget covering everything but public works (air bases).

By drastic revision this was cut to \$23.4 billion before submission to the Defense Department.

Further reviews by Secretary Lovett's office and the Bureau of the Budget personnel resulted in a reduction to \$23.4 billion.

This figure was tentatively allotted as the USAF's part in an overall \$55 billion 1953 budget recommended to the Bureau of the Budget and the White House by the Department of Defense.

Then the Bureau of the Budget did the expected cutting and recommended only a \$49-billion budget, with \$16.6 billion for Air Force.

Following a meeting at the White House Dec. 28, 1951, the President determined that combined expenditures for the Defense Department and military foreign aid should be held to less than \$60 billion. To do that, Defense Department decided to stretch out the period in which the full strength would be obtained. This resulted in a \$20.7-billion Air Force budget, meaning a stretchout of about a year in the date of readiness of the Air Force, to the end of fiscal 1955.

When the House got through with the proposed military budget, there were two kinds of cuts:

• A budgetary cut of \$1.67 billion, which will reduce the number of modernization wings and delay the date of readiness of the 135-combat wing force to about the end of fiscal year 1957.

• A ceiling on the overall defense budget of \$46 billion which, when divided among the services, resulted in a limitation of \$17.4 billion on the Air Force.

So, Mr. Fulleter summarized, "It is of the utmost importance that we get the money to build as close as possible to the date of July 1954—which I would estimate to be July 1, 1955, if Section 618 of H. R. 7591 and the House cuts are eliminated and if the Air Force gets its \$20.7 billion of appropriations for fiscal year 1953, plus the necessary sum for public works in order that we may have the bases from which the planes are going to fly."

This lack of light, and the ridiculous scenes indulged in by the Air Force, resulted in sapient surrender to politics. Because neither the people nor their elected representatives were told what these slashes would mean to our air strength.

Mr. Chapman and the people cannot depend on our top military authorities—with access to the most authentic information available—to tell us when danger threatens how can Congress and the people be expected to decide how much money is needed for the national welfare?

—Robert H. Wood

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